Web-based Counseling System

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ABSTRACT

Web-based Counseling System (WBCS) is a web-based system developed with the objectives of implementing the system in the Internet as a solution to provide counseling services to those who needs. The system allows the authorized users to use all the services that the system provides.

In this new millennium, computers and Internet have proved that they are an important part of human's life. No doubt, without Internet and computers, human's life will be a chaos. So, this project is developed to suit the changes of the world.

This Web-based Counseling System is a combination of web-based system and client-server application system. The clients will be any desktop computers link to the server. Whenever the clients want to retrieve information from the system, it just pass a request to the server and get the reply from the server. The server side contains all the related HTML pages, database and rules. The server will also processes the request from the client and then sends the result back to the clients.

The Web-based Counseling System can be divided into two sections: user and administration. The user section allows users browse through all the services that the system provides like search, chat room, forum, analysis and feedback. The administration section provides an application for the administrator to update the counseling information in the database, view user profile, view feedback and post important news to the users.

With so many people sitting in front of a computer and accessing to the World Wide Web, Web-based Counseling System will be an alternative choice for them to visit. They can share their experience with the other users and this will really help those who need that suggestions. Although the system cannot read the non-verbal actions from the counselees, but it helps those who are shamed to discuss their problems with other people.

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Introduction

CHAPTER 1: INTRODUCTION

1.1 Project Overview

The web-based counseling system is a web-based application aimed to provide online counseling services for anyone that needs it. With this web-based counseling system, the users can get some important principles and solutions regarding to their problems. The web-based counseling system takes advantages of the Internets where it provides borderless and no time constraint benefits to the users. The users from elsewhere can get the services from our page by just access to our web-page; providing that the users have Internet connection and web browser. Others than that, the users can benefit from the web-page at anytime that the users prefer.

In this web-based counseling system, we provide:

- Search engine for principles and solutions
- Chat room
- Forum
- Job listing
- Pen-pal column
- Backend application
- Analysis
- Help file
- Feedback

1.2 Definition of Counseling

Simply stated, counseling is any relationship in which one person is helping another person to better understand and solve some problem. Friends and relatives provide a type of counseling, as do clergy, academic advisors, teachers, and many others. Counselors have a broad range of experience in developing "helping relationships" and working with many different situations.

In counseling we look for what we find good in ourselves. The good can be used as a model for the things we would like to change. Counseling is a change (growth: healing) process in which people (individuals, groups, couples, and families) are helped to:

- express themselves (catharsis) in a safe, supportive, collaborative, non-judgmental climate
- identify, sort-out, clarify their problem laden "stories" (deepened awareness of past & present story and alternative future stories)
- identify non-helpful patterns (e.g. "crisis" pattern);
- learn, where appropriate, more helpful coping skills (e.g. "assertive skills")
- identify and achieve goals that are important to them.

For those with a humanistic bent, the ultimate goal for counseling is to help people to recognize and accept their own internal worth, i.e., to integrate their learned habits of thinking about themselves (their internal messages and images) and their learned behaviors (feelings, physical responses, & actions) to be congruent with who they really are in their essence (beautiful, loving people).

1.3 Counseling Approaches

1.3.1 Cognitive

The cognitive therapies include Rational-Emotive, Cognitive-Behavioral, Reality, and Transactional Analysis. Common traits among the cognitive approaches include a collaborative relationship between client and therapist, homework between sessions, and the tendency to be of short duration. These therapies are best known for treating mild depression, anxiety, and anger problems.

1.3.2 Behavioral

This is based on the premise that primary learning comes from experience. The initial concern in therapy is to help the client analyze behavior, define

problems, and select goals. Therapy often includes homework, behavioral experiments, role-playing, assertiveness training, and self management training. Like its cognitive therapy cousins it utilizes collaboration between client and therapist, and is usually of short duration.

1.3.3 Psychoanalytic

The original so called "talking therapy" involves analyzing the root causes of behavior and feelings by exploring the unconscious mind and the conscious mind's relation to it.

1.3.4 Person-Centered (Rogerian)

Founded by Carl Rogers in the 1940's, like Adlerian therapy, a basic premise is that we are all "becoming," we are all moving towards self-actualization. This therapy is often considered the most optimistic approach to human potential. This often lengthy therapy is based on developing the client-therapist relationship. The therapist is to provide the conditions necessary for the client's growth: genuineness, unconditional positive regard, and empathic understanding. To be genuine the therapist must strive to be transparent, open, willing to express at opportune times their own identity in the relationship. There is no hiding behind expertise or degrees. Therapists must be constantly doing their own inventory. Unconditional positive regard is synonymous with acceptance and appreciation of the client for who the client is in the present. Empathic understanding is based on the therapist's ability to see the world through the client's eyes, to move into the client's world at the deepest levels and experience what the client feels.

1.3.5 Gestalt Therapy

"Gestalt," a German word meaning "whole," operates as a therapy by keeping the person in what is known as the here and now. Therapists help clients to be attentive to all parts of themselves: posture, breathing, methods of movement, etc. Unresolved conflicts are worked out in the therapy session as if they are happening in that moment. An emphasis is placed on personal responsibility for one's own well-being as aware as possible at all times of one's interactions with the environment. This usually lengthy therapy is accomplished by the therapist asking questions and suggesting experiments which will increase the awareness and sensitivity to the many parts of the client's total self.

1.3.6 Eclectic Therapy

When therapists are asked their theoretical orientation, this is the answer most often given. This is essentially a common sense approach to helping people by tailoring therapy to the needs of the individual client.

1.4 Objectives

The objective of this project is to develop a web-based counseling system for those who needs. This system will provide effective solutions and information according to what users need. The initial objectives of this project are:

i. Maximize human capital in providing information
   To provide some effective solutions and information with less human work by storing all the solutions and information into the database and retrieved by users according to their needs.
ii. Discuss problems with professional counselors
   The chat room of the system provides is a place where the users can discuss the problems with the counselors. From this chat room, the users that facing the communication problem can just express themselves by typing in front of a computer
iii. Discuss problems with the users who came across the same situation in chat room or forum
iv. Improve user profile control
   With the online registration in the web-based counseling system, the personalities of the users can be better controlled
v. Borderless
   The system provides counseling services to the people from all over the world
vi. System enhancement
   The counselors can enhance the system by just adding some new information into the database according to the trend of world

1.5 Project Motivation

Undoubtedly, Internet has become one of the most important topics to talk about in the community. Internet has emerged as an important and effective communication channel in the late 20th century. The graphical user interface in the Internet browser eases the users to browse the Internet effectively. As a result, organization, universities and companies rush to open their own web-page to provide information to the users through Internet.

This project is to develop a web-based counseling system. This system will be expected to assist the target users to tackle and overcome their problems. The problems can be:

- Youth problems like drug addict, love, abuse and so on
- Academic problems like tackling exam, being interviewed, doing presentation and so on
- Career problems like career depression, relationship with colleagues, competing with others for a higher position and so on

Based on preliminary research, current web-based counseling in global does not have suitable solutions to really help the users. So we provide the chat room and forum facilities so that the users can discuss their problems with counselors and other users as well. Despite of having the solutions and principles, users may get some real experience from other user as well.

1.6 Project Scope

This project can be divided into a few modules below:

- Security module

  Since the system is accessible through Internet, so the security of the system is a main issue to prevent unauthorized users to enter our system. Therefore, the system will require the user ID and password whenever the users want to enter the system. The new user that wants to access to this system needs to register first and supplies a new username and password to the system.

- Search module

  This module will be a search engine where the user can seek for principles and solutions while just key in some keywords.

- Chat Room module

  This module will be divided into two part: chat room and forum. The users can discuss their problems will the counselors and other users as well regarding to their problems.

- Forum module

  Forum is a place where users can discuss any kinds of problems and give comments or suggestions to other users.

- Administration module

  The administration module will be a stand alone application that allows the system administrator (counselors) upgrade the information in the database, view the user's profile and present the important news at the web-page.

- Feedback module

  Feedback is a form that users can give their opinions and comments with the services that the web based counseling system provides.

- Analysis module

  Analysis module is a graph presentation where it shows the percentage of information that the users most need when they access to web based counseling system.

- Employment module

  This is a place where employer can post available jobs offered and employee can look for jobs that they need.

1.7 Project Schedule

To achieve the project objectives, a project schedule is planned to manage the time for the tasks that needed to be accomplished.

Project Schedule									
Activity	Jun 2001	Jul 2001	Aug 2001	Sept 2001	Oct 2001	Nov 2001	Dec 2001	Jan 2001	Feb 2001
System Study									
Requirements Analysis									
Design									
Coding									
Testing									
Documentation									

1.8 Expected Strengths from the Web-based Counseling System

Below are some of the strengths that can be expected after as this project is completed and implemented:

i. Clients or users can get the counseling services or information from anywhere, anytime as long as they have the Internet access to our web page.

ii. Save time because the web page can allow several users getting the counseling services concurrently.

iii. Clients can discuss their problems among themselves or with counselors online.

iv. Improved control - the administrator (counselor) can upgrade the information database with a standalone application.

1.9 Expected outcome of the Web-based Counseling System

This project should develop an interactive Web-based Counseling System that provides useful and effective counseling information. This system can receive comments and suggestions from the user to enhance the system. The system also provides real-time information exchange function between users with users or users with counselors. This system also provides a backend application for the administrator and counselors to maintain and control the system.

Chapter 2

Literature Review

CHAPTER 2: LITERATURE REVIEW

Literature review is a background study about the knowledge and information needed to develop the project. It helps in better understanding on the system requirement and methodologies used in project development.

2.1 Who are the clients?

The clients can be anybody else from public, ranging from students to undergraduates and all the professionals and non-professionals. The clients can be somebody who has:

- Life depression
- Marital problems
- Family problems
- Exam problems
- Study problems
- Relationship problems
- Career pressure
- Jobless

2.2 Software Engineering

Software engineering is the application of scientific principles to the orderly transformation of a problem into a working software solution and the subsequent maintenance of that software until the end of its useful life. Software engineering is more than just programming: the software engineering process generally starts long before a line of code is written and continues long after the initial version of the program has been completed. In the software development, it is generally pass through a number of stages, or phases as below:

1. **Software requirements**

   Includes analyzing the software problem at hand and concludes with a complete specification of the desire external behavior of the software system to be built.

2. **Preliminary design**

   Decomposes the software system into its actual constituent components and then iteratively decomposes those components into smaller and smaller sub components until the subcomponents located at the leaves of the resulting design tree are small enough.

3. **Detail design**

   Defines and documents algorithms for each modules in the design tree and that will be realized as code.

4. **Coding**

   Transforms algorithms defined during the detailed design stage into a computer-understandable language. This is usually performed in two steps:

   - converting the algorithm into a high level language
   - converting the high level language into a machine language

5. **Unit Testing**

   Checks each coded module for the presence of bugs. Unit testing's purpose is to ensure that each as-built module behaves according to its specification define during detailed design.

6. **Integration testing**

   Interconnects sets of previous tested modules to ensure that the sets behave as well as they did as independently tested modules. Ideally, each integrated set of modules should correspond to a component in the design tree during preliminary design.

7. **System testing**

   Checks that the entirely software system embedded in its actual hardware environment behaves according to Software Requirements Specification.

8. **Delivery, production and deployment**

   After final system testing, the software and its surrounding hardware become operational.

9. **Maintenance and enhancement**

   The maintenance and enhancement processes are actually a full development life cycle. If there are changes in coding or design, the subsequent testing stages must be performed.

10. **Software system test planning**

    Accesses how the software system will be tested for conformity to the software requirement. It includes the development and documentation of test plans and procedures and might include the full-scale development of a test environment to test the actual system under test.

11. **Integration test planning**

    A plan and procedure will be generated and documented, which concerning the order of system integration, test data to be used to test sets of components, and how the integration testing activity will be done.

12. **Unit test planning**

    Testing plans and procedures for testing every module independently and thoroughly will be generated and documented.

2.3 System Development Life Cycle (SDLC)

2.3.1 System Initiation and Feasibility Study

i. Identify need and complete service request
ii. Develop general requirements for the new system.
iii. List constraints in the new system
iv. Obtain appropriate priority for implementation and resource allocation.

2.3.2 Project Planning and Functional Analysis

i. Draft preliminary project action plan.
ii Document the new system.

2.3.3 System Design

i. Prepare reports, forms, data entry specifications, controls, backup procedures.
ii. Prepare screen layouts.
iii. Prepare module descriptions.
iv. Specify database requirements.
v. Conduct functional walk-through.
vi. Conduct technical walk-through.
vii. Prepare user testing and training plans.

2.3.4 Programming

i. Prepare module development schedule
ii Write, test and document modules
iii. Conduct initial user unit testing

2.3.5 Implementation

i Prepare detailed implementation plan
ii. Finalize user procedures manual
iii. Obtain system acceptance signatures from users
iv. Install software
v. Monitor the new system

2.3.6 Post-Implementation Evaluation

i. Prepare system review schedule

ii. Periodic system reviews

2.4 Counseling Approaches (From Counseling and Career Section of University Malaya)

Counseling services include individual counseling and group counseling. The principles regarding individual counseling are:

a.) Level one – pre-session

Clients who attend counseling session normally don't realize that they have psychological problems. So, in this first level of counseling process it is important to build a better relationship between clients and counselors. This will give some encouragement and confident to the clients.

b.) Level two – starting relationship

This level is an important level where counselor has to build a trustworthy relationship between client and counselor. Topics of discussion will be more on the clients feeling, their characteristics and also includes moral principles. The counselors have to start or build the relationship through a harmonies way to avoid hurting the client's feeling.

c.) Level three – Understanding

After the client familiar and confident enough with the counselor, they will easily tell the counselor what was actually happened that disturb their feelings. Normally, at this level, the client will try to explain thoroughly all the incidents that happened to them. The counselor's responsibility is to be a patient listener. They also need to reflect the incidents, feelings and experience, ask for clearer explanation and make confrontations if it is needed. The counselor will keep determining the client problems until the counselor and client is really clear about the problems.

d.) **Level four – define the problem**

At this level, the counselor and client will discuss about every problems and difficulties faced by the client. The counselor and client will discuss about the definition of the problem, factors and sources of the problems.

e.) **Level five – Alternative**

After the problems have been defined, the counselor needs to discuss thoroughly about every risk and effects that the client will face for each of the alternatives. Alternatives should come from the client and will be discuss thoroughly so that the client will get insight and choose the alternatives that may help in solving their problems and difficulties. Among the alternatives are:

- Derive mission of life that are realistic.
- If the client is lack of caring their health, changes should be done on the client's daily habits such as changes in diet and do more exercise at home.
- Space out a litter bit of time for relaxation and to "allow yourself time to just let it happen."
- Change the ways of mixing around with friends or other peoples. Try to tell them your feelings and don't keep all the angers and disappointment.
- Analysis on how to spend the time daily. Learn to divide properly every period of time for certain jobs.
- Try to say "no" if the things can't be handle properly.
- Learn to jokes around and smile always to reduce stress.
- Learn to divide jobs to other people.
- Lastly, make yourself clear. Clear about every single things you are doing and what you actually wanted to do. You must have a clear life mission.

f.) **Level six – Action**

Taking action is more concentrate on selection of alternatives that have been thoroughly discussed with the counselor. Action to be taken is out of the counseling session. While taking an action, three considerations are:

- The successful of taking the action
- The failure of taking the action
- Dare not take the action

g.) **Level seven – Abortion**

The counseling process is abort when the client is ready to stop the counseling session. The client is ready to take action which is not under the counseling session control to reduce or eliminate the problems. The counselor will stop the session and plan the next appointment.

h.) **Level eight – Following guidance**

Counselor and client will meet and discuss about the action taken by the client. This session is held to determine whether the user face a positive or negative effects after their actions.

2.5 Internet Technologies

Overview

The Internet, sometimes called simply "the Net," is a worldwide system of computer networks – a network of networks in which users at any one computer can, if they have permission, get information from any other computer (and sometimes talk directly to users at other computers).

Today, the Internet is a public, cooperative, and self-sustaining facility accessible to hundreds of millions of people worldwide. Physically, the Internet uses a portion of the total resources of the currently existing public telecommunication networks. Technically, what distinguishes the Internet is its use of a set of protocols called TCP/IP (Transmission Control Protocol/Internet Protocol).

The most widely used part of the Internet is the World Wide Web (often abbreviated "WWW" or called "the Web"). Its outstanding feature is hypertext, a method of instant cross-referencing. In most Web sites, certain words or phrases appear in text of a different color than the rest; often this text is also underlined. When an user select one of these words or phrases, user will be transferred to the site or page that is relevant to this word or phrase. Sometimes there are buttons, images, or portions of images that are "clickable." If user moves the pointer over a spot on a Web site and

the pointer changes into a hand, this indicates that you can click and be transferred to another site.

Using the Web, user has access to millions of pages of information. Web "surfing" is done with a Web browser, the most popular of which are Netscape Navigator and Microsoft Internet Explorer. The appearance of a particular Web site may vary slightly depending on the browser user uses. Also, later versions of a particular browser are able to render more "bells and whistles" such as animation, virtual reality, sound, and music files, than earlier versions.

With the advance in technology, it has become extremely important to not only get information on time but also in the most efficient and economical way. Below are the main advantages of networking.

1. Sending and receiving of electronic mail
2. Sharing of information
3. Sharing of expensive resources like printers.
4. Sharing of programs (software) which are otherwise too expensive.
5. When computers are networked, in most cases they share one database. This is advantages in that there is little or no duplication of data. It also enhances security.
6. The problems of having bulky filing cabinets, big offices etc are eliminated.

2.6 Client-server architecture

Client server architecture concepts are derived from older, early development of enterprise computing concepts of teleprocessing. This old concept is now known as legacy systems because it was the starting point of the development of distributed computing. It is the history of today's modern client server model. Legacy systems (teleprocessing) share the same concept as today's client server computing in the way

that they distribute processing and computing resources over the host and the satellite computers.

Client Server systems do not look to be different from the legacy systems. In fact, they both look the same. It is true that Client server systems and legacy systems both physically look the same. Do not get misled with their physical appearances. In term of how they perform, both of them represent two completely different systems.

In client server architecture, the satellite computers (client) are designed to do immediate processing before passing the information/requested processing to the host (server). This way, the burdens of the host's resources (CPU and memory) are reduced. The hosts are now needed to do only some of the processing because the other portions of processing were already done at the client levels. The main idea of Client server is to distribute data storage, data access logic (processing required to access data), application logic (computer applications), and presentation logic (presentation of information to the user and the acceptance of the user's command) to improve the performance of processing user's task.

2.6.1 Two-tier architecture

A two-tier architecture is where a client talks directly to a server, with no intervening server. This is one of the quickest ways of building a client-server application. In this environment, much of the processing is performed on the client computer, using the memory space and processing power of the client to provide much of the functionality of the system.

2.6.2 Three-tier architecture

This type of architecture is a lot more complicated compared to the 2-tier client architecture. The basic understanding of 3-tier client is the same as the 2-tier client model; the only difference is that there are another layer of servers between the main servers and the clients. Compared to 2 tier client architecture, 3 tier architecture operates more efficiently. With 3 tier client, the workload of the central server is distributed over other servers before it actually interacts with the clients.

The second tier servers are usually distributed over a Wide Area Network (WAN), or distributed based on the tasks of each servers (database server, mail server, file server, etc.). As you can see in this model, the complications are added with more network application programs, operating systems, and task application programs, which connect all of the servers and clients over a wider range of computer networks. All of these can be accomplished by using programs from a single vendor or many different vendors. These kinds of configurations have the most likelihood to have association with multiple task-specified application programs, creating more complex systems to manage.

2.6.3 Multi-tier architecture

In multi-tier architecture, each of the major pieces of functionality is isolated. The multi-tier system can be created, by partitioning the application logic among various hosts. Encapsulation of distributed functionality in such a manner provides significance advantages such as reusability and reliability. Application servers that contain the business rules and the processing logic can access other application servers.

2.7 Web server

Web server is a piece of software running on a computer that distributes web pages to users on demand, and provides an area in which to store and organize the pages of a web site. The machine that runs the web server software could be a remote sitting at the other side of the network, or even on the other side of the world, or it could very own home machine. The term client-server probably overuse but in fact when use to describe the working of the web, its almost perfect.

2.7.1 Internet Information Services 5.0 (IIS)

Internet Information Services 5.0 (IIS) is the Windows 2000 Web service that makes it easy to publish information on your intranet.

Internet Information Services 5.0 has many new features to help Web administrators to create scalable, flexible Web applications.

Below are the features of IIS:

1. Security
2. Administration
3. Programmability
4. Internet Standards

2.7.1.1 Security

Digest authentication: Digest authentication allows secure and robust authentication of users across proxy servers and firewalls. In addition, Anonymous, HTTP Basic, and integrated Windows authentication (formerly known as Windows NT Challenge/Response authentication and NTLM authentication) are still available.

Secure Communications: Secure Socket Layer (SSL) 3.0 and Transport Layer Security (TLS) provide a secure way to exchange information between clients and servers. In addition, SSL 3.0 and TLS provide a way for the server to verify who the client is before the user logs on to the server. In IIS 5.0, client certificates are exposed to both ISAPI and Active Server Pages, so that programmers can track users through their sites.

Server-Gated Cryptography: Server-Gated Cryptography (SGC) is an extension of SSL that allows financial institutions with export versions of IIS to use strong 128-bit encryption. Although SGC capabilities are built into IIS 5.0, a special SGC certificate is required to use SGC.

Kerberos v5 Authentication Protocol Compliance: IIS is fully integrated with the Kerberos v5 authentication protocol implemented in Microsoft® Windows® 2000, allowing one to pass authentication credentials among connected computers running Windows.

Certificate Storage: IIS certificate storage is now integrated with the Windows CryptoAPI storage. The Windows Certificate Manager provides a single point of entry that allows one to store, back up, and configures server certificates.

Fortezza: The U.S. government security standard, commonly called Fortezza, is supported in IIS 5.0. This standard satisfies the Defense Message System security architecture with a cryptographic mechanism that provides message confidentiality, integrity, authentication, and access control to messages, components, and systems. These features can be implemented both with server and browser software and with PCMCIA card hardware.

2.7.1.2 Administration

Now one can restart one Internet services without having to reboot a computer.

Backing Up and Restoring IIS: One can back up and save a metabase setting to make it easy to return to a safe, known state.

Configuration Options: One can set permissions for Read, Write, Execute, Script, and FrontPage Web operations at the site, directory, or file level.

Personal Web Manager: IIS 5.0 includes a simplified administration tool called Personal Web Manager (PWM). This tool can help one administer and monitor a personal publishing site.

Site Traffic Monitoring: Real-time graphs that display site traffic statistics, such as requests per day, requests per hour, visitors per day, and visitors per hour.

Programmability: Full support for Active Server Pages, including performance-enhanced ASP components and new error-handling functionality.

Centralized Administration: Administration tools for IIS use the Microsoft® Management Console (MMC). MMC hosts the programs, called snap-ins, that administrators use to manage their servers. One can use IIS snap-in from a computer running Windows 2000 Professional to administer a computer on an intranet running Internet Information Services on Windows 2000 Server.

2.7.1.3 Programmability

Active Server Pages: One can create dynamic content by using server-side scripting and components to create browser-independent dynamic content. Active Server Page (ASP) provides an easy-to-use alternative to CGI and ISAPI by allowing content developers to embed any scripting language or server component into their HTML pages. ASP provides access to all of the HTTP request and response streams, as well as standards-based database connectivity and the ability to customize content for different browsers.

New ASP Features: Active Server Pages has some new and improved features for enhancing performance and streamlining a server-side script.

Application Protection: IIS 5.0 offers greater protection and increased reliability for a Web application. By default, IIS will run all of an application in a common or pooled process that is separate from core IIS processes. In addition, one can still isolate mission-critical applications that should be run outside of both core IIS and pooled processes.

ADSI 2.0: In IIS 5.0, administrators and application developers will have the ability to add custom objects, properties, and methods to the existing ADSI provider, giving administrators even more flexibility in configuring their sites.

2.7.1.4 Internet Standards

Standards Based: Microsoft Internet Information Services 5.0 complies with the HTTP 1.1 standard, including features such as PUT and DELETE, the ability to customize HTTP error messages, and support for custom HTTP headers.

Web Distributed Authoring and Versioning (WebDAV): Enables remote authors to create, move, or delete files, file properties, directories, and directory properties on one server over an HTTP connection.

PICS Ratings: One can apply Platform for Internet Content Selection (PICS) ratings to sites that contain content for mature audiences.

FTP Restart: Now File Transfer Protocol file downloads can be resumed without having to download the entire file over again if an interruption occurs during data transfer.

2.8 Web Browser

A browser is an application program that provides a way to look at and interact with all the information on the World Wide Web. The word "browser" seems to have originated prior to the Web as a generic term for user interfaces that let user browse (navigate through and read) text files online. By the time the first Web browser with a graphical user interface was invented (Mosaic, in 1992), the term seemed to apply to Web content, too. Technically, a Web browser is a client program that uses the Hypertext Transfer Protocol (HTTP) to make requests of Web servers throughout the Internet on behalf of the browser user. A commercial version of the original browser, Mosaic, is in use. Many of the user interface features in Mosaic, however, went into the first widely-used browser, Netscape Navigator. Microsoft followed with its Microsoft Internet Explorer. Today, these two browsers are the only two browsers that the vast majority of Internet users are aware of. Although the online services, such as

America Online, originally had their own browsers, virtually all now offer the Netscape or Microsoft browser. Lynx is a text-only browser for UNIX shell and VMS users. Another recently offered and well-regarded browser is Opera.

While some browsers also support e-mail (indirectly through e-mail Web sites) and the File Transfer Protocol (FTP), a Web browser is not required for those Internet protocols and more specialized client programs are more popular.

The most popular web browsers in the market nowadays are Microsoft Internet Explorer and Netscape Navigator.

2.9 Development Tools

2.9.1 Programming tools

2.9.1.1 Active Server Pages

These days, "Web application" is almost as broad a term as "application." Using a Web-based client for a distributed or client/server application is becoming more common. Active Server Pages (ASP) is a server-side scripting environment that user can use to create dynamic Web pages or build powerful Web applications. ASP pages are files that contain HTML tags, text, and script commands. ASP pages can call ActiveX® components to perform tasks, such as connecting to a database or performing a business calculation. With ASP, user can add interactive content to your Web pages or build entire Web applications that use HTML pages as the interface to the customer.

2.9.1.2 Visual Basic

The "Visual" part refers to the method used to create the graphical user interface (GUI). Rather than writing numerous lines of code to describe the appearance and location of interface elements, one can simply add pre-built objects into place on screen.

The "Basic" part refers to the BASIC (Beginners All-Purpose Symbolic Instruction Code) language, a language used by more programmers than any other language in the history of computing. Visual Basic has evolved from the original BASIC language and now contains several hundred statements, functions, and keywords, many of which relate directly to the Windows GUI. Beginners can create useful applications by learning just a few of the keywords, yet the power of the language allows professionals to accomplish anything that can be accomplished using any other Windows programming language.

The Visual Basic programming language is not unique to Visual Basic. The Visual Basic programming system, Applications Edition included in Microsoft Excel, Microsoft Access, and many other Windows applications uses the same language. The Visual Basic Scripting Edition (VBScript) is a widely used scripting language and a subset of the Visual Basic language.

Visual Basic is a programming environment from Microsoft in which a programmer uses a graphical user interface to choose and modify pre-selected sections of code written in the BASIC programming language.

Since Visual Basic is easy to learn and fast to write code with, it's sometimes used to prototype an application that will later be written in a more difficult but efficient language. Visual Basic is also widely used to write working programs.

2.9.1.3 Java

Java is a programming language expressly designed for use in the distributed environment of the Internet. It was designed to have the "look and feel" of the C++ language, but it is simpler to use than C++ and enforces an object-oriented programming model. Java can be used to create complete applications that may run on a single computer or be distributed among servers and clients in a network. It can also be used to build a small application module or applet for use as part of a Web page. Applets make it possible for a Web page user to interact with the page.

The major characteristics of Java are:

- The programs you create are portable in a network. Your source program is compiled into what Java calls bytecode, which can be run anywhere in a network on a server or client that has a Java virtual machine. The Java virtual machine interprets the bytecode into code that will run on the real computer hardware. This means that individual computer platform differences such as instruction lengths can be recognized and accommodated locally just as the program is being executed. Platform-specific versions of your program are no longer needed.
- The code is robust, here meaning that, unlike programs written in C++ and perhaps some other languages, the Java objects can contain no references to data external to themselves or other known objects. This ensures that an instruction can not contain the address of data storage in another application or in the operating system itself, either of which would cause the program and perhaps the operating system itself to terminate or "crash." The Java virtual machine makes a number of checks on each object to ensure integrity.
- Java is object-oriented, which means that, among other characteristics, an object can take advantage of being part of a class of objects and inherit code that is common to the class. Objects are thought of as "nouns" that a user might relate to rather than the traditional procedural "verbs." A method can be thought of as one of the object's capabilities or behaviors.
- In addition to being executed at the client rather than the server, a Java applet has other characteristics designed to make it run fast.
- Relative to C++, Java is easier to learn.

2.9.2 Database Server

2.9.2.1 What is a database

A database is a collection of data that is organized so that its contents can easily be accessed, managed, and updated. The most prevalent type of database is the relational database, a tabular database in which data is defined so that it can be reorganized and accessed in a number of different ways. A distributed database is one that can be dispersed or replicated among different points in a network. An object-oriented programming database is one that is congruent with the data defined in object classes and subclasses.

Databases contain aggregations of data records or files, such as sales transactions, product catalogs and inventories, and customer profiles. Typically, a database manager provides users the capabilities of controlling read/write access, specifying report generation, and analyzing usage. Databases and database managers are prevalent in large mainframe systems, but are also present in smaller distributed workstation and mid-range systems such as the AS/400 and on personal computers. Structured Query Language is a standard language for making interactive queries from and updating a database such as IBM's DB2, Microsoft's Access, and database products from Oracle, Sybase, and Computer

2.9.2.2 Microsoft SQL Server 2000

Microsoft SQL Server 2000 is a relational database system with a rich development environment. Microsoft SQL Server 2000 provides agility to data management and analysis. From a data management and analysis perspective, it is critical to turn raw data into system's intelligence and take full advantage of the opportunities presented by the Web. A complete database and data analysis package, Microsoft SQL Server 2000 opens the door to the rapid development of a new generation of enterprise-class business applications. Microsoft SQL Server 2000 is a fully Web-enabled database, providing core support for Extensible Markup Language (XML) and the ability to query across the Internet and beyond the firewall.

Below are the features of Microsoft Server 2000

- Fully Web-Enabled

Microsoft SQL Server 2000 provides extensive database programming capabilities built on Web standards. Rich XML and Internet standard support the ability to store and retrieve data in XML format easily with built-in stored procedures. User can also use XML updategrams to insert, update and delete data easily.

- Easy access to data through the Web

With Microsoft SQL Server 2000, user can use HTTP to send queries to the database, perform full-text search on documents stored in database, and run queries over the Web with natural language.

- Powerful, flexible Web-based analysis

Microsoft SQL Server 2000 Analysis Services capabilities are extended to the Internet. User can access and manipulate cube data by means of a Web browser.

- Highly Scalable and Reliable

Achieve unparalleled scalability and reliability with Microsoft SQL Server 2000. With scale up and scale out capabilities, SQL Server meets the needs of demanding ecommerce and enterprise applications.

Microsoft SQL Server 2000 takes advantage of symmetrical multiprocessor (SMP) systems. SQL Server Enterprise Edition can use up to 32 processors and 64 GB of RAM.

Scale out distributes the database and data load across servers.

- Availability

Microsoft SQL Server 2000 achieves maximum availability through enhanced failover clustering, log shipping, and new backup strategies.

- Integrated and extensible analysis services

With Microsoft SQL Server 2000, user can build end-to-end analysis solutions with integrated tools to create value from data. Additionally, user can automatically drive business processes based on analysis results and flexibly retrieve custom result sets from the most complex calculations.

- Quick development, debugging, and data transformation

Microsoft SQL Server 2000 features the ability to interactively tune and debug queries, quickly move and transform data from any source, and define and use functions as if they were built in to Transact-SQL. Users can visually design and code database applications from any Visual Studio tool.

- Simplified management and tuning

With Microsoft SQL Server 2000, it is easy to manage databases centrally alongside all enterprise resources. Stay online while easily moving and copying databases across computers or between instances.

2.9.2.3 Microsoft Access 2000

The Microsoft Access 97/2000 is a full-featured multiuser relational database management system that designed for the Microsoft Windows operating systems (such as Windows 9x, Windows NT, Windows 2000).
Access 2000 is extremely visually oriented and easy to use. It makes extensive use of drag-and-drop and visual design for queries, forms, and reports. Access 2000 comes with an integrated development environment (IDE), including incremental compilation, a fully interactive visual debugger, breakpoints, and single step-through

These capabilities combine to make Microsoft Access an extremely powerful platform for developing client-server database solutions.

Microsoft Access Strengths:

- Microsoft Access is fully networkable
  Microsoft Access is designed for both stand-alone and multi-user applications. The program is fully networkable.
- Microsoft Access is Y2K compliant
  As might be expected, both Microsoft Access 97 and Microsoft Access 2000 are fully year 2000 compliant.

2.9.2.4 Analysis between Access 2000 and SQL 2000

Access 2000 differs from Microsoft SQL Server in that Access is a desktop application, whereas Microsoft SQL Server is an enterprise-level database. While the two database solutions operate at different ends of the spectrum and meet different organizational needs, they are complementary. The right database for a particular situation depends on several factors, including scalability (number of users, size of data), reliability (mission-critical data, such as corporate payroll versus potential sales contacts), and available database experience (office user vs. professional database administrator).

As a client/server database, SQL Server differs from Access 2000, a file-server database, by providing greater scalability and reliability for mission-critical data. Access databases typically service individuals and small groups of 10 to 20 users with no more than a megabyte of data, which could easily be processed on the desktop. Microsoft SQL Server can support thousands of users with terabytes of information and provide other enterprise-level database capabilities. For example, SQL Server offers 24/7 support by providing the ability to conduct administration and maintenance while the database is online. It also protects against data loss with a two-phase commit, which can be useful if a particular transaction is interrupted midstream due to power outage, network failure, or other reasons.
Access 2000 has two major components: an application development environment

and a data engine. The application development environment is Visual Basic. The data engine can be either Jet, which continues to be the default data engine for Access 2000, or Microsoft Data Engine (MSDE), the newer option, which incorporates technology from SQL Server 2000 and represents Microsoft's strategic direction. Nevertheless, the choice of data engine depends on enterprise requirements, usage, and feature set.

MSDE is fully compatible with the SQL Server 2000 code base, enabling developers to write one application that scales from a PC running the Windows 95 operating system to multiprocessor clusters running Windows NT Server, Enterprise Edition.

Several technologies are included in MSDE, such as dynamic locking, which automatically chooses the optimal level of lock (row, key range page, or table) for all database operations. This maximizes the tradeoff between concurrency and performance, resulting in optimal usage. Dynamic self-management enables the server to monitor and manage itself, allowing for hands-off standard operations. Merge replication allows users to modify distributed copies of a database at different times, online or offline, and combine all the work later into a single uniform result. And like Jet 4.0, MSDE includes Unicode.

In incorporating technology from SQL Server 2000, MSDE allows developers to make SQL Server 2000 features available to hundreds or thousands of users. For example, access to SQL Server's Data Transformation Services makes it easy to import data from any source, including OLE databases, Windows NT Directory Services, and spreadsheets, and to transform or export that data to any other store. Access to Microsoft SQL Server OLAP Services enables analysis of complex information by optimizing data access. The PivotTable Services, for instance, run on client workstations and aid desktop multidimensional analysis by making the PivotTable's dynamic views more intuitive and putting all of the PivotTable options on the screen for easy use. Through Microsoft SQL Server 2000, Excel users for the first time have the capability to analyze gigabytes and terabytes of data.

Through its use of SQL Server 2000 technology, MSDE allows users to pose questions in English instead of forming queries with complex SQL statements. In

addition, MSDE supports parallel queries, allowing steps in a single query to be executed in parallel, delivering optimal response time.

Enterprise applications require scalability, robustness, and security, which can be obtained with MSDE or SQL Server, but not with Jet. In terms of scalability, MSDE and SQL Server have clear advantages over Jet. For example, MSDE and SQL Server support SMP, whereas Jet does not. While MSDE or SQL Server support virtually an unlimited number of concurrent users, and SQL Server offers access to terabytes of data, Jet supports a maximum of 255 users and only 2GB of data. MSDE and SQL Server provide transaction logging, but Jet does not. If Access 2000 is being developed or used in an enterprise environment, MSDE is the better choice of data engine. Even if current needs are not considered "enterprise level," using the Access front end with the MSDE back end positions the database for scaling as business needs grow.

In terms of robustness, MSDE or SQL Server is the better choice, particularly if applications need transaction support even in the event of a network, system, or application crash. In the same situation, Jet would not be a good choice because it does not support atomic transactions, that is, it does not guarantee that all changes performed within a transaction boundary are committed or rolled back.

2.9.3 Operating System

An operating system (sometimes abbreviated as "OS") is the program that, after being initially loaded into the computer by a boot program, manages all the other programs in a computer. The other programs are called applications or application programs. The application programs make use of the operating system by making requests for services through a defined application program interface (API). In addition, users can interact directly with the operating system through a user interface such as a command language or a graphical user interface (GUI).

An operating system performs these services for applications:

- In a multitasking operating system where multiple programs can be running at the same time, the operating system determines which applications should run in what order and how much time should be allowed for each application before giving another application a turn.
- It manages the sharing of internal memory among multiple applications.
- It handles input and output to and from attached hardware devices, such as hard disks, printers, and dial-up ports.
- It sends messages to each application or interactive user (or to a system operator) about the status of operation and any errors that may have occurred.
- It can offload the management of what are called batch jobs (for example, printing) so that the initiating application is freed from this work.
- On computers that can provide parallel processing, an operating system can manage how to divide the program so that it runs on more than one processor at a time.

All major computer platforms (hardware and software) require and sometimes include an operating system. Linux, Windows 2000, VMS, OS/400, AIX, and z/OS are all examples of operating systems.

2.9.3.1 Windows 2000 Professional

Windows 2000 Professional is the Windows operating system for business desktop and laptop systems. It is used to run software applications, connect to Internet and intranet sites, and access files, printers, and network resources. Windows 2000 Professional is a graphical user interface operating system. It allows the user to interact with the computer in a way that uses icons and graphics. Windows 2000 Professional also support long file name and built-in networking capabilities.

Windows 2000 strengths:

Easy-to-Use Business Desktop

Microsoft operating systems dominate at the desktop level because of their ease of use. Even the most casual of computer users are familiar with basic Windows

navigational techniques and conventions. Windows 2000 Professional offers an even more intuitive and intelligent user interface. The company's often-imitated Wizard technology has been enhanced to provide simpler configuration processes. The user interface departs with the familiar Windows 95 GUI, but this change brings about a more Web-oriented countenance based on Microsoft's Internet Explorer.

Low Total Cost of Ownership

Even though Windows 2000 Professional is a "fat" client (it requires 64MB of RAM to run efficiently), it costs a lot less than most Unix clients to run on the desktop. There have been numerous independent studies, including those by Deloitte and Touche, showing that Microsoft's platform beats Unix in initial cost of purchase and long-term operation. Many large international corporate organizations have switched from Unix to NT in the past, with cost cited as the catalyst for change.

Microsoft has aligned the new Windows 2000 operating systems with its "Zero Administration" initiative. Windows 2000 Professional includes numerous client-side features to make it easier to administer, deploy, and maintain the desktop. One of its new innovations is its IntelliMirror technology, which automatically mirrors a user's client environment--including data, applications, administrative settings, and system files--on Windows 2000 servers. The Active Directory system also enhances administration by providing integration with everything in the enterprise, with its management components reaching every desktop.

Device Support

Windows NT is often criticized for its lack of device configuration capabilities. For some reason, Microsoft did not include the popular Plug-and-Play technology found in Windows 98. Windows 2000 Professional includes Plug-and-Play for detecting hardware on both local systems and laptops. The operating system also supports some of the state-of-the-art technologies used by corporate users, including native support for DVD; Universal Serial Bus (USB) mouse, printer, and scanner products; and digital cameras, recorders, and other IEEE 1394-compatible devices. Improved Support for Mobile Users

Windows 2000 Professional offers excellent support for mobile users, including such features as accurate battery checking, a hibernate mode (which writes a memory image to disk before shutting down), improved power management, and new network access and file synchronization systems. It also supports the new Advanced Configuration and Power Interface (ACPI) specification. The specification, developed by Microsoft, Intel, and Toshiba, gives the operating system the ability to control the amount of power awarded to each attached device.

2.9.3.2 UNIX

UNIX (sometimes spelled "Unix") is an operating system that originated at Bell Labs in 1969 as an interactive time-sharing system. UNIX became the first operating system written in the C language. Partly because it was not a proprietary operating system owned by any one of the leading computer companies and partly because it is written in a standard language and embraced many popular ideas, UNIX became the first open or standard operating system that could be improved or enhanced by anyone. UNIX operating systems are used in widely-sold workstation products from Sun Microsystems, Silicon Graphics, IBM, and a number of other companies. The UNIX environment and the client/server program model were important elements in the development of the Internet and the reshaping of computing as centered in networks rather than in individual computers. Linux, a UNIX derivative available in both "free software" and commercial versions, is increasing in popularity as an alternative to proprietary operating systems.

2.9.3.3 UNIX and Windows 2000 Professional

Windows 2000 Professional is an enhancement of Windows NT technology. So, comparing NT technology and UNIX technology is important to decide which type of server is suitable for this project.

NT can communicate with many different types of computers. So can UNIX. NT can secure sensitive data and keep unauthorized users off the network. So can UNIX. Essentially, both operating systems meet the minimum requirements for operating systems functioning in a networked environment.

An NT server will validate an authorized user, but once the user is logged on to the NT network, all he/she can do is access files and printers. The NT user cannot just run any application on the NT server (in order to take advantage of the superior processing power of server hardware). An NT user can only run special applications that have been written in two pieces, i.e. client/server applications. When a user logs in to a UNIX server, he/she can then run any application (provided the user is authorized to do so), thus taking the processing load off his/her workstation. So, NT is more secure to solve the hackers problem.

In today's world, reliability is often more important than speed. Although performance is largely a function of hardware platform (see the next section), it is in the area of reliability that the choice of operating systems has the most influence. Indeed, Windows NT is a great improvement over Windows 3.1 or Windows 95, but it still has a long way to go before it can reach the level of stability offered by even the Open Source UNIX operating systems. So, UNIX is more stable comparing to NT. But, since there are no transactions involved in the Web-based Counseling System, so the reliability is not a great issue to be considered.

The argument that Windows NT is easier to manage due to its GUI (point-and-click graphical user interface) is really a great advantage to the novice users. No doubt, most of the people prefer GUI than CLI (command line interface). As we are not familiar with CLI, Windows is more preferable than UNIX for this project.

Chapter 3

Methodology and System Analysis

CHAPTER 3: METHODOLOGY AND SYSTEM ANALYSIS

3.1 Introduction

Before designing a functional system, there is a need to do system analysis. It is an important phase in the software development life cycle.

System analysis for Web-based counseling system (WBCS) is an attempt to understand the problem and limitations of the existing system. The overall emphasis of the analysis is to gather information of the current system, requirements, problems and solutions for the system being developed. The main purpose of this analysis phase is:

- To survey on available systems of this type to gain some extra understandings for the system being developed.
- To interview with counselors regarding the system requirements to meet the goal of counseling.
- To acquire knowledge on how does counseling works.
- To gain an overall understanding of the system flow and system process.
- To gain appropriate data and requirements.
- To find out the strength and weakness of the system developed.
- To identify the software and hardware requirements to develop the system.

3.2 Methodology used

In order to successfully implement the system, an appropriate system development model should be followed. The methodology used in developing the WBCS is prototyping.

Prototyping is a technique of constructing a partial implementation of a system so that the user can learn more about a problem. Software prototyping is an information

system development methodology based on building and using a model of a system for designing, implementing, testing, and installing the system.

Prototyping is based on building a model of a system to be developed. Moreover, the initial model should include the major program modules, the database, screens, reports, and the inputs and outputs that the system will use for communicating with other (interfacing) systems.

Prototyping uses the model for designing the system. The initial version of the prototype is not full system, but it does contain its designer's understanding of the database, screens, and reports. As the user and Information Systems people begin to work with the prototype, it will change. The initial version of the prototype is a skeletal version of the system; it does not contain all the processing and validation rules that the system will ultimately have. As those working with the prototype modify it and add to it, they will be completing the design of the system.

Prototyping uses the model to implement the system. The initial version of the prototype will consist of programs written in some language to move data back and forth between the screens, the database, reports, and the inputs and outputs used to communicate with interfacing systems. At first, these programs may do little processing, they may actually dummy it. As prototyping process continues, newer versions of programs that perform more closely to those of the ultimate system will replace the original versions. Prototyping uses the model to perform both the system and the acceptance testing of the system. The initial version of the prototype, as well as all subsequent versions, will communicate with system test versions of feeding systems and systems to be fed. So, the prototyping will always run in "system test" mode. And, since the user will be working with the prototype from the beginning, the user will be performing "acceptance testing" of the prototype from the beginning.

Prototyping does not go beyond a mock-up if, after building and experimenting with the initial model of the system, and possibly making a few modifications to it. With the Prototyping Methodology, even though a prototype may be little more than a mock-up when it is first built, it becomes the first one of its kind by the time it is

finished. So, when the prototyping process ends, the prototype has become the system.

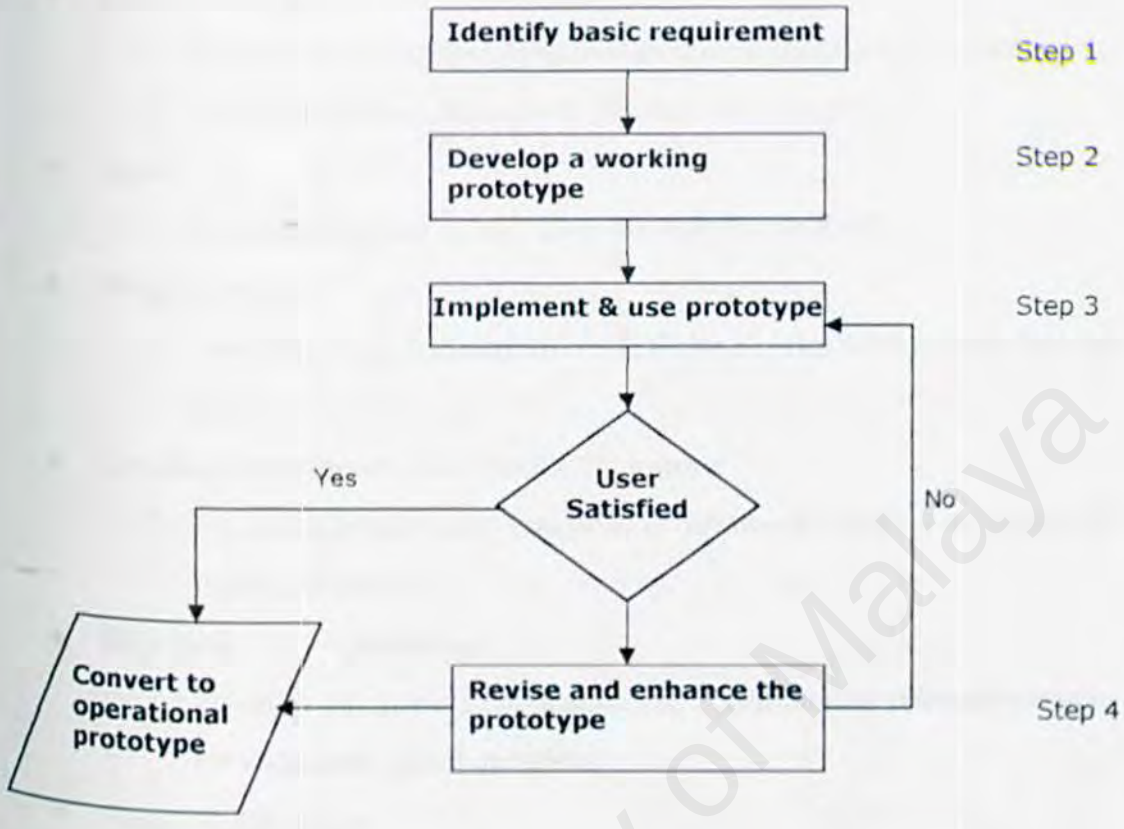

Figure 3.1 Prototyping Diagram

3.3 Analysis on the Existing System

3.3.1 Modules in Existing System

- Web based User Information
  - View, delete and update user information, around-the-clock, around-the-globe.
- Web based Search Administration
  - A comprehensive search engine based on name, description or any other criteria to retrieve handle number, release schedules and other relevant information instantaneously. Users information can be easily modified through simple forms on the system and immediately sent to all users. Staff can make modifications to the forms and database on the central server and from there reach all users.

- Web based user management
  - Provide administrative functions to manage user details and contacts
- Solution provider
  - Provide administrative functions to review solution given and quick access to detailed description for each users stage
- Report
  - Provide extensive reports over the web for the staff
- Printable reports
  - Provide simple and custom-made forms to print reports from the web page
- Downloadable Reports into Excel CSV Format
  - Provide administrative functions to download reports into Excel CSV format for review
- Help Desk/FAQ Application
  - Develop sub module application and accommodate relevant answers for frequently asked questions
- E-mail Notifications
  - Provide email notification functions for each batch update and transaction
- Admin Area
  - Provide login menu so that admin can log in and use several functions provided
- What's New Area
  - Provide a bulletin board so user can receive news, memo and notification from different counselor.
- Web Security
  - Provide relevant application security to prevent fraudulent access to website. These include the proper method to allow registered user, administrative functions to prevent illegal access and login to the system

3.3.2 Strengths on Existing System

- Good Control and Maintenance for Information

  The administrator can view, update and delete the information in the system's database. So, the data information is under controlled and ease for maintenance.

- Easy to Search for Solutions and Principles

  The existing system provides a search engine to seek for relevant information instantaneously.

- Provides Report

  The existing system provides simple and custom made forms to print reports from the web page.

- Security

  The existing system provides Login module to prevent either unauthorized user or administrator access to the system. With this, the user's information will not expose to others.

- E-mail Notifications

  The existing system provides email notification functions to inform the users for system updating.

3.3.3 Weakness on Existing System

- No Real-Time Information Exchange Functions

  Sometimes, user needs extra information and the information that the system provides is not enough. So, a real-time information exchange function like chat room or forum is needed so that the users can discuss and exchange ideas with each and others.

- No Direct Interactions with Professional Counselors

  The existing does not provide any methods for user to interact with the professional counselors directly.

- No client record

  There are no records to summarize the user's characteristics when they access the page. The user record can contain the information like how many times the user visit the page, what kind of information that the user needs, what problems that the user has and so on.

- No counselor directly involved

  The existing system does not involve any professional counselors. So the counseling procedures are not under good inspection.

3.4 Development Tools

3.4.1 Active Server Pages 3.0 (ASP)

ASP is a great tool for creating dynamic web pages. ASP is a Microsoft technology; it works well with the functionality of a programming language that will generate the HTML for the web page dynamically.

ASP is great in two ways.

- The HTML is not created until the user wants to see the web page
- It does not care what web browser is being used

ASP can customize web pages to the specific needs of each individual user. It means that the text, images, tables, forms and even the layout of the page can be selected automatically at the time the user requests the page.

The components for ASP:

- Server-side scripting

The server-side script is an instruction set that is processed by the server and which generates HTML code. The resulting HTML is sent as part of the HTTP response to the browser. The server-side scripting languages can be: CGI, ColdFusion, Java Server Pages and Personal Home Pages (PHP).

- Client-side scripting

A client-side script is also an instruction set, but it is not processed by the web server. Instead, it is sent to the browser (as part of the HTTP response) and is

processed by the browser; the result is then displayed by the browser on the monitor. The client-side scripting languages can be: Java, ActiveX Controls and Dynamic HTML.

- Data Store Access

Universal Data Access (UDA) is a method to access the data held in all the diverse applications and formats. As part of its UDA strategy, OLE-DB will be used.

OLE-DB is the evolution of the anonymous data store OLE-DB is very similar to the idea behind ODBC that is a standard for accessing data. It was designed to allow the programmer to use a common set of routines to access the data stored in database, regardless of the type of database in which the data was stored. So, the OLE-DB can allow the user to connect to its legacy databases through your existing ODBC connections.

ActiveX Data Objects (ADO) is a set of objects that allow the programmers to program their data access logic from languages like Visual Basic as well as scripting languages. ADO is a higher-level model than OLE-DB, which means that it simplifies some of the complexities of programming with OLE-DB.

3.4.2 Microsoft Visual Basic 6.0

Visual Basic is a Microsoft Windows programming language. Visual Basic programs are created in an Integrated Development Environment (IDE). Visual Basic is derived from the BASIC programming language. Visual Basic is a distinctly different language providing powerful features such as graphical user interfaces, event handling, and access to the Win32 API, object-oriented features, error handling, and structured programming and so on.

Below are features in Visual Basic:

- Graphical User Interface (GUI) introduced by Apple Computer made it easier for users to communicate with computers. With this, people began using the

mouse device to point to things on the screen representing the actions the computer should take and clicking a mouse button to select a desired action. Visual Basic can create user-friendly graphical user interfaces.

- Object-oriented programming

Object-oriented programming in Visual Basic is a programming technique with components. Visual Basic programmers can create their own user-defined types called classes. Each class contains date as well as the set of methods which manipulate the data. Visual Basic can craft new classes and reuse existing classes.

- ActiveX

ActiveX technologies seek ways to integrate the local machine with the World Wide Web (WWW), Internet and Intranet. Files and other documents that may seem like they are residing or executing on one machine may actually be stored or executing on a remote machine. ActiveX has a wide range of distributed computing technologies.

3.4.3 Hyper Text Markup Language (HTML)

To publish information for global distribution, one needs a universally understood language, a kind of publishing mother tongue that all computers may potentially understand. The publishing language used by the World Wide Web is HTML (from HyperText Markup Language).
HTML gives authors the means to:

- Publish online documents with headings, text, tables, lists, photos, etc.
- Retrieve online information via hypertext links, at the click of a button.
- Design forms for conducting transactions with remote services, for use in searching for information, making reservations, ordering products, etc.
- Include spread-sheets, video clips, sound clips, and other applications directly in their documents.

3.5 Conclusion of Development Strategies

3.5.1 Advantages of using ASP:

- Script Language-independent: ASP allows using VBScript, Jscript or Perl ("perlscript") and having it executed on the server without having to learn another scripting language.
- Utilize COM components from your web server - reuse any functionality built using COM components for your company's software product can on your website through ASP pages. ASP is the connection between the conventional software and the web site.
- ODBC links to any data source.
- No compilation (saves time, but also a disadvantage).
- User can use server-side Active components (DLLS).

3.5.2 *Advantages of using JavaScript:*

JavaScript is an interpreted programming or script language from Netscape. Script languages generally take longer to process than compiled languages, but are very useful for shorter programs.

JavaScript is used in Web site development to do such things as:

- Automatically change a formatted date on a Web page
- Cause a linked-to page to appear in a popup window
- Cause text or a graphic image to change during a mouse rollover

JavaScript uses some of the same ideas found in Java, the compiled object-oriented programming derived from C++. JavaScript code can be imbedded in HTML pages and interpreted by the Web browser (or client). JavaScript can also be run at the server as in Microsoft's Active Server Pages before the page is sent to the requestor. Both Microsoft and Netscape browsers support JavaScript, but sometimes in slightly different ways.

3.5.3 Advantages of Using Visual Basic:

- Data access features to create databases, front-end applications, and scalable server-side components for most popular database formats, including Microsoft SQL Server and other enterprise-level databases.
- ActiveX™ technologies allow the uses of the functionality provided by other applications, such as Microsoft Word word processor, Microsoft Excel spreadsheet, and other Windows applications.
- Internet capabilities make it easy to provide access to documents and applications across the Internet or intranet from within application, or to create Internet server applications.
- The finished application is a true .exe file that uses a Visual Basic Virtual Machine that can be freely distribute.

3.6 Functional Requirements

A functional requirement describes the interaction between the system and its environment. The functional requirements for WBCS can be divided into nine modules. They are search, chat room, forum, security, feedback, administration, help, analysis and extra utilities.

3.6.1 Search Module

The purpose of search module is for the users to seek for relevant solutions and principles for their problems. The solutions and principles will be stored in the database according to the topics like career, academic, family, marriage and others. The sources of this solutions and principles are from the counseling handbook, other counseling web page and local counseling department.

3.6.2 Chat Room

There are two kinds of chat room for the system. They are:

I. **Counselor with user**

This chat room will only allow one counselor and one user involved. So the user information can be kept confidentially and only the in charge counselor will know it. The user can view the counselor's bibliography before enter the chat room. So, the user has the right to choose the counselor.

II. **User with user**

This chat room is opens for public as any authorized users can participate on it. For this chat room, user can discuss his or her problem with other user.

3.6.3 Forum

The user can open a forum and get the reply from other user or counselor. This forum is visible to all the authorized users.

3.6.4 Security

To maintain the security of the system, LOGIN is needed before enter the page. There are two types of login: user login and administration login.

i. ***User login***

If the user makes his first visit to WBCS web page, the user needs to sign in first before the user can uses any facilities in the web page. The user ID is unique for every user. When the user sign in the registration form, the user needs to specify the counselor who will in charge for him. Then a record will open under that particular counselor and the counselor will know all the information of his clients. There is password to keep all the user record and counselor cannot view other counselor's client record.

ii. ***Administration login***

Administration login is for the counselors and administrator to enter the WBCS web page and backend application. First of all, the administrator needs to identify the qualification of the counselors who applied to become the WBCS counselors. If the apply is approved, the administrator will send the user ID and password to the counselor for him to login to WBCS web page and backend application.

3.6.5 *Administration*

Administration module is a standalone backend application that only the administrator and the counselors can use it. There are four scopes in the administration application: database maintenance, view user profile, view feedback and post the important news to the memo board of the WBCS web page.

i. **Database maintenance**

There is a form for the administrator or the counselors to fill in and update the counseling information in the database. The administrator or the counselors can update new solutions and principles for the existing topics in the database or even post new problem and its solutions as well.

ii. **View user profile**

The administrator has right to view all the user profiles but the counselor can only his or her client profiles.

iii. **View feedback**

The feedback that the user sends will store into the database and the administrator can view it through this administration application.

iv. **Post important news**

The administrator can post some important notice or news about the WBCS through the memo board in the web page.

3.6.6 *Feedback*

Users can send his comments, opinions, weakness or questions to WBCS administrator so that the administrator can take further considerations and actions about the WBCS.

3.6.7 *Analysis Module*

When the user using the search engine to seek for solutions, the user's problem will be record down and categorized into appropriate topics like teenage, marriage, career, academic and others. The percentage of users that have the same problem will be calculated and the result will be shown in bar chart.

3.6.8 Extra Utilities

There are two extra utilities that the WBCS provides. They are job listing column and pen-pal column.

i. **Job listing column**

This job listing column will benefit both employers and employees. The employers can post the vacancies available by just filling up a form through the WBCS web page. The information of the vacancies available are displayed in the web page for free. Then, the employees can access to WBCS web page and seek for suitable job.

ii. **Pen-pal column**

If the user wants to join the WBCS pen-pal column, the user just needs to fill up a simple form and the user's personal information will be appeared in the pen-pal column and others user can email to you straight away.

3.7 Non-functional Requirements

3.7.1 Security

Safety on transforming information is an essential for the web-based system. To prevent unauthorized user to access, the access rights must be maintained on proper way. There are three types of access to WBCS.

- The administrator has all the access right such as read, insert, upgrade and deletes records to the database. The administrator also checks the qualification of the counselors who apply to become the WBCS member and assign new user name and password to those counselors who are qualified to become WBCS counselors.
- The counselors have read and insert rights to the database. But, the counselors can only read certain part only like user record. Counselor can only read his client record but not others. Counselor can insert important statement to the user record.

- The normal users have the read access only to the system. They can only view the contents that are displayed for public without having the authority to insert, upgrade and delete the information in the database.

3.7.2 Database Maintenance

- Backup database

  Backup the database is an important part of monitoring the databases. A backup copy of the database is essential to prevent unexpected data corruptions.

- Archive database

  Archive the database is to clean up the database by delete some of data files that are no use after a long period of time. By archiving the database, it can reduce the storage of the database.

- Restore database

  Restore database will copy the backup database file to replace the damaged database file. This will help the user to recover the database.

3.7.3 User Friendliness

The system interface design should be user-friendly to give a good image to the users. Despite of that, the user-friendly interface can let the users master the WBCS easily.

3.7.4 Flexibility

Flexibility refers to the system's ability to adopt new technologies and resources as well as implementation in changing environments. New features can be added to the system if there is a need.

3.7.5 Performance

Response time and throughput are factors to be considered for web page development.

Chapter 4

System Design

CHAPTER 4: SYSTEM DESIGN

4.1 Overview

System design is a process where all the user requirements will be transformed into a real world application which will be developed conceptually or logically. The purpose of system design is to select and plan system that meets the requirements needed to develop the system desired. System design is a very important stage to develop a system. A design specification is needed to do system design. The design specification describes the features of a system, the components or elements of a system and their appearance to the user.

There are four stages in the system design process, they are:

1) Database design
2) System architecture
3) Process Design
4) User Interface Design

4.2 Database design

The database is constructed using the Microsoft SQL Server 2000. The database that will be used for this project is a relational database. A relational database is a collection of data items organized as a set of formally-described tables from which data can be accessed or reassembled in many different ways without having to reorganize the database tables.

The standard user and application program interface to a relational database is the structured query language (SQL). SQL statements are used both for interactive queries for information from a relational database and for gathering data for reports.

Benefits of the relational database:

- Minimizes duplicated data and eliminates certain types of processing errors that can occur when data are stored in other ways.

- Columns contain data that relate one row to another.

Below are some tables' designs that will be used for WBCS:

Table 1: User Registration Table

Field Name	Data Type	Length	Description
userID	nvarchar	12	User identification
password	nvarchar	8	User password
firstname	nvarchar	20	User first name
lastname	nvarchar	20	User last name
dob	smalldatetime	4	Date of birth
age	int	4	User age
gender	char	6	Gender
occupation	nvarchar	30	User occupation
phone	nvarchar	20	Telephone number
email	nvarchar	40	Email address
address	nvarchar	50	User permanent address
postcode	numeric	5	Postcode number
state	nvarchar	15	State name
country	nvarchar	15	Country name
usertype	nvarchar	1	Type of user such as counselor or user
counselor	nvarchar	12	Counselor's ID
secret_question	nvarchar	100	Question that help user to remember password
answer	nvarchar	100	Answer to the secret question

This table will store all the relevant personal data of the WBCS users. The user_ID is unique for every user and the password is determined by the user

All the personal data that the user provides are highly confidential. The user can change the information when there is a need.

Table 2: Feedback Table

Field Name	Data Type	Length	Description
Ender	nvarchar	12	User ID of the user who send the feedback
date	smalldatetime	8	Date of the feedback sent
Title	nvarchar	30	Title of the comment
Comments	nvarchar	200	Contents of the feedback

This table will store all the feedbacks that the users sent through the WBCS web page.

Table 3: Analysis Table

Field Name	Data Type	Length	Description
Scope	nvarchar	30	Scope of information that WBCS provides such as career, academic ...
Keywords	nvarchar	200	Keywords that belong to that scope such as academic can have school, teacher ...
no_of_hit	int	4	It will store how many times that this scope of information is needed by the user

This table is used to calculate the percentage of users who seek for information on the same topic. When the user enters a string of words in the

search box, the string of words will be checked whether it matches with the word in keywords column. If it is matched, the no_of_hit will increase one. This table is used to draw a bar graph to show the percentage of information that the users needs when they access to WBCS.

Table 4: User Personal Record Table

Field Name	Data Type	Length	Description
date	smalldatetime	8	The date that the user enter WBCS web page
problem	nvarchar	100	The whole string that the user type into the search box

This table will keep the whole string of words that the user type in the search box. So, every user will have his own table to keep his search string. So the table's name is the same as userID.

Table 5: Problems Table

Field Name	Data Type	Length	Description
Problem	nvarchar	50	Problem's title
keyword	nvarchar	100	Keywords of that problem
solution_link	nvarchar	25	The name of the table to store all the solutions for that particular problem

This table will list out all the problems under a particular table.

Table 6: Problem Solution Table

Field Name	Data Type	Length	Description
solution	nvarchar	50	Title of the solution
description	nvarchar	500	Description of the solution.

This table will store all the solutions for a particular problem.

Table 7: Message Board Table

Field Name	Date Type	Length	Description
writedate	smalldatetime	4	The date the message write
message	nvarchar	100	The contents of that message

This table will store all the messages that will show on the WBCS. The administrator is responsible to write the message to tell the users of WBCS about the major events that will happen on WBCS.

Table 8: Pen-pal Table

Field Name	Data Type	Length	Description
userID	nvarchar	12	Username

This table will store the userID that was registered to the pen-pal column.

Table 9: Job Table

Field Name	Data Type	Length	Description
CompanyName	nvarchar	40	The name of the company
Position	nvarchar	30	Name of the Position
TotalVacancy	nvarchar	2	How many vacancy available
Email	nvarchar	30	Company's Email
Expired_days	nvarchar	2	Publish duration
Register_date	smalldatetime	4	Register date

This table is used to store the company details that want to publish its vacancies to the WBCS users.

4.3 System Architecture

Web-based Counseling System is running in a Microsoft Windows 2000 server. Users can login to the system using a client personal computer.

The WBCS can be divided into two major parts: user and administration.

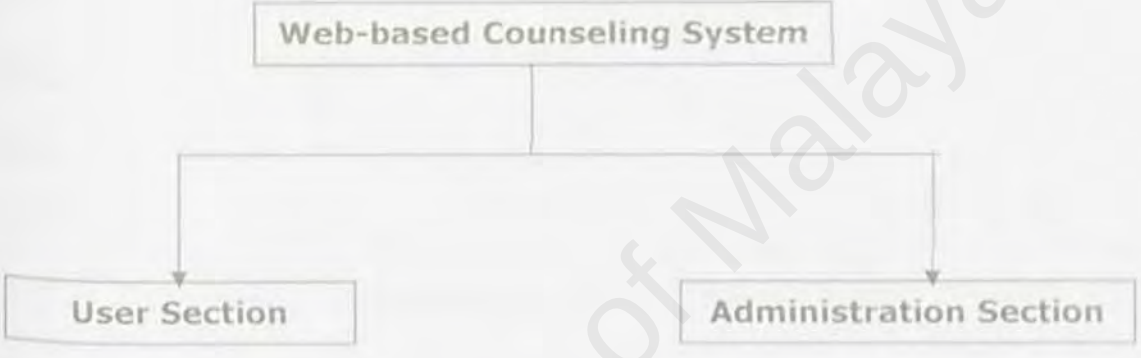

Figure 4.1 System Design Diagram

4.3.1 User Section

The user section mainly is the features that WBCS provides in the web page.

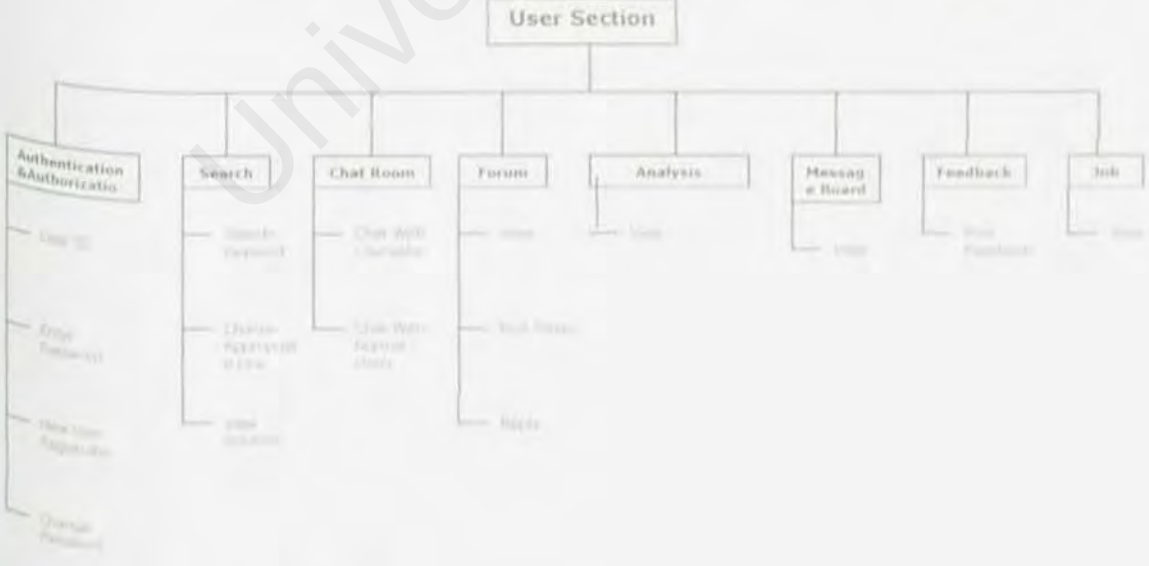

Figure 4.2 User Section Diagram

4.3.2 *Administration Section*

The administration section is mainly a software application where the administrator can monitor the WBCS.

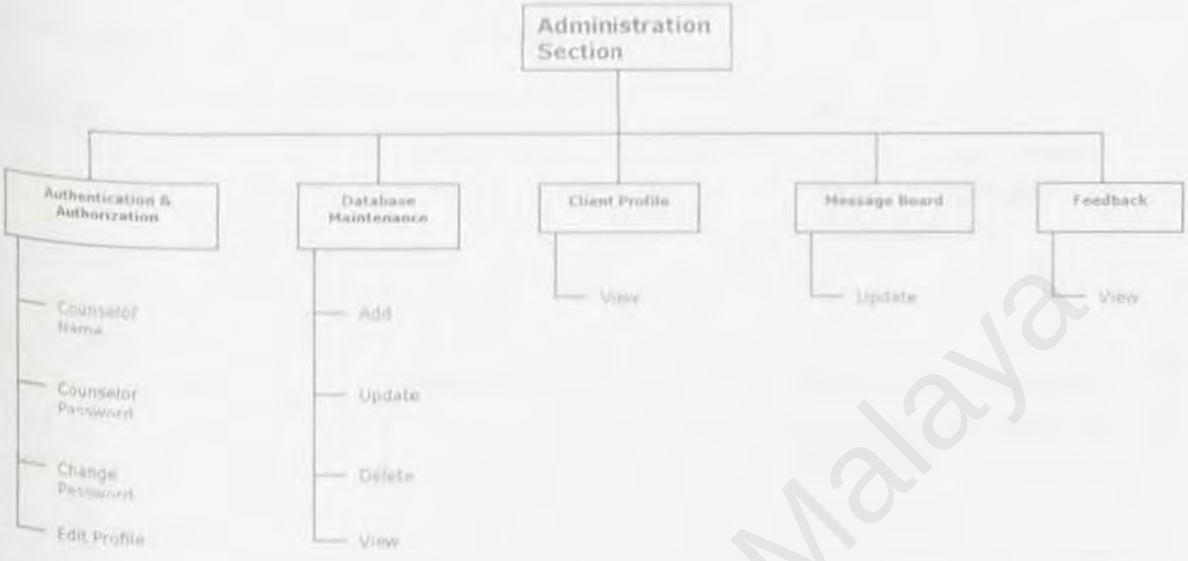

Figure 4.3 Administration Section Diagram

4.4 Process Design

4.4.1 Data Flow Diagram

A data flow diagram (DFD) is a graphical technique that depicts information flow and transformation of data from input to output. The data flow diagram is used to represent the system or software at any level of abstraction.

Below are the symbols used in DFD diagrams:

Symbol	Name	Description
	Source or destination of data	sources or destinations outside the specified system boundary
	Processes	transforms of incoming data flow(s) to outgoing data flow(s)
	Data Store	data repositories for data that is not moving
	Data Flow	movement of data in the system

Figure 4.4 Context Diagram

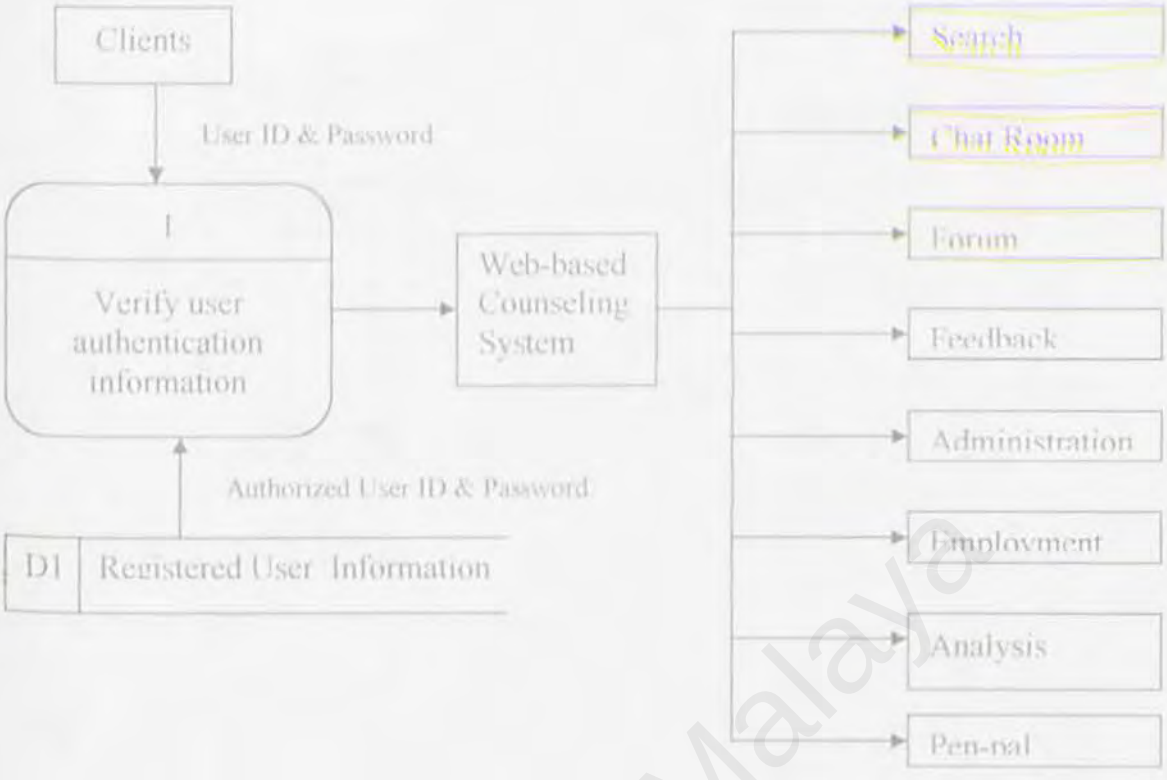

Figure 4.5 Data Flow Diagram Level-1

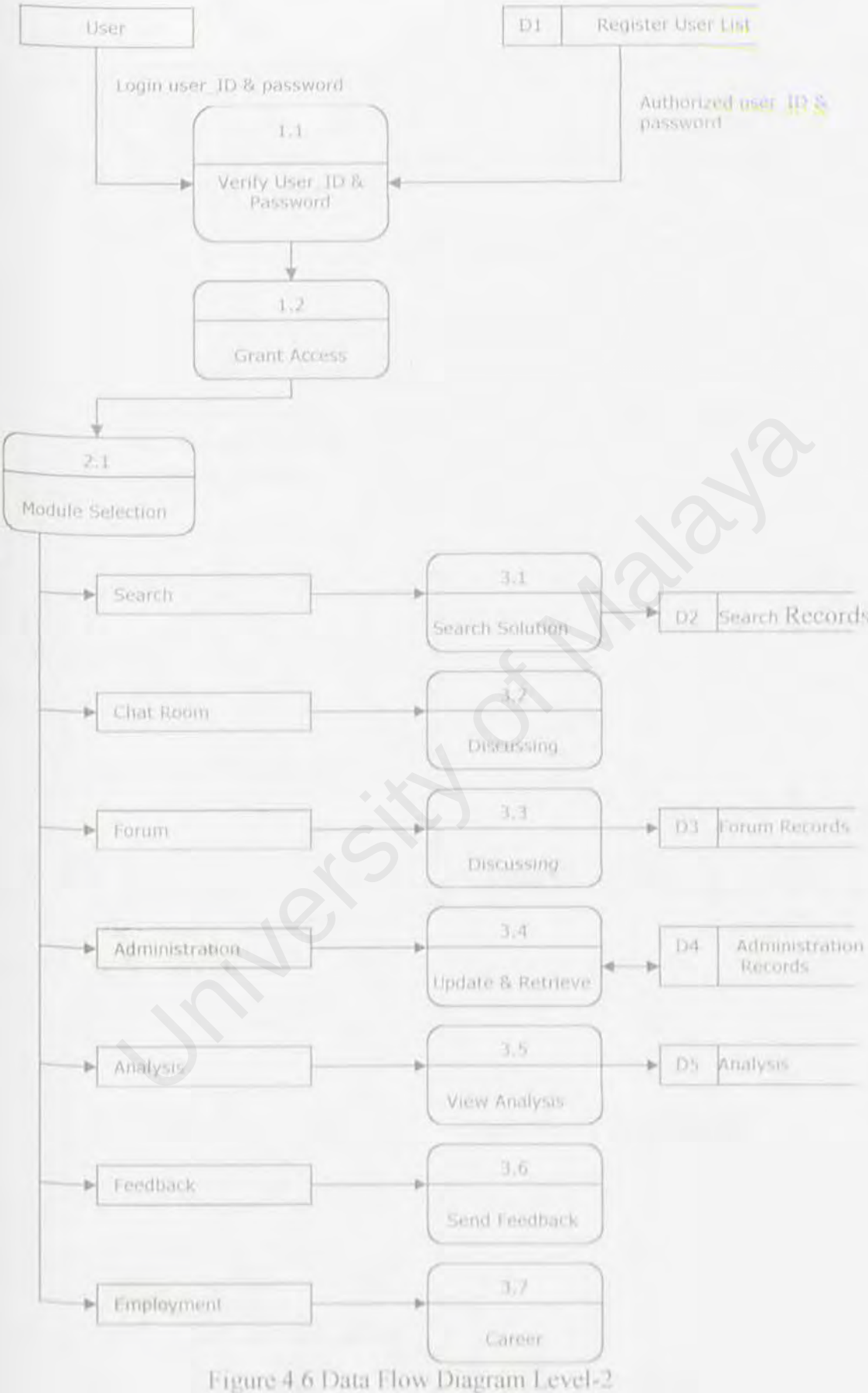

Figure 4.6 Data Flow Diagram Level-2

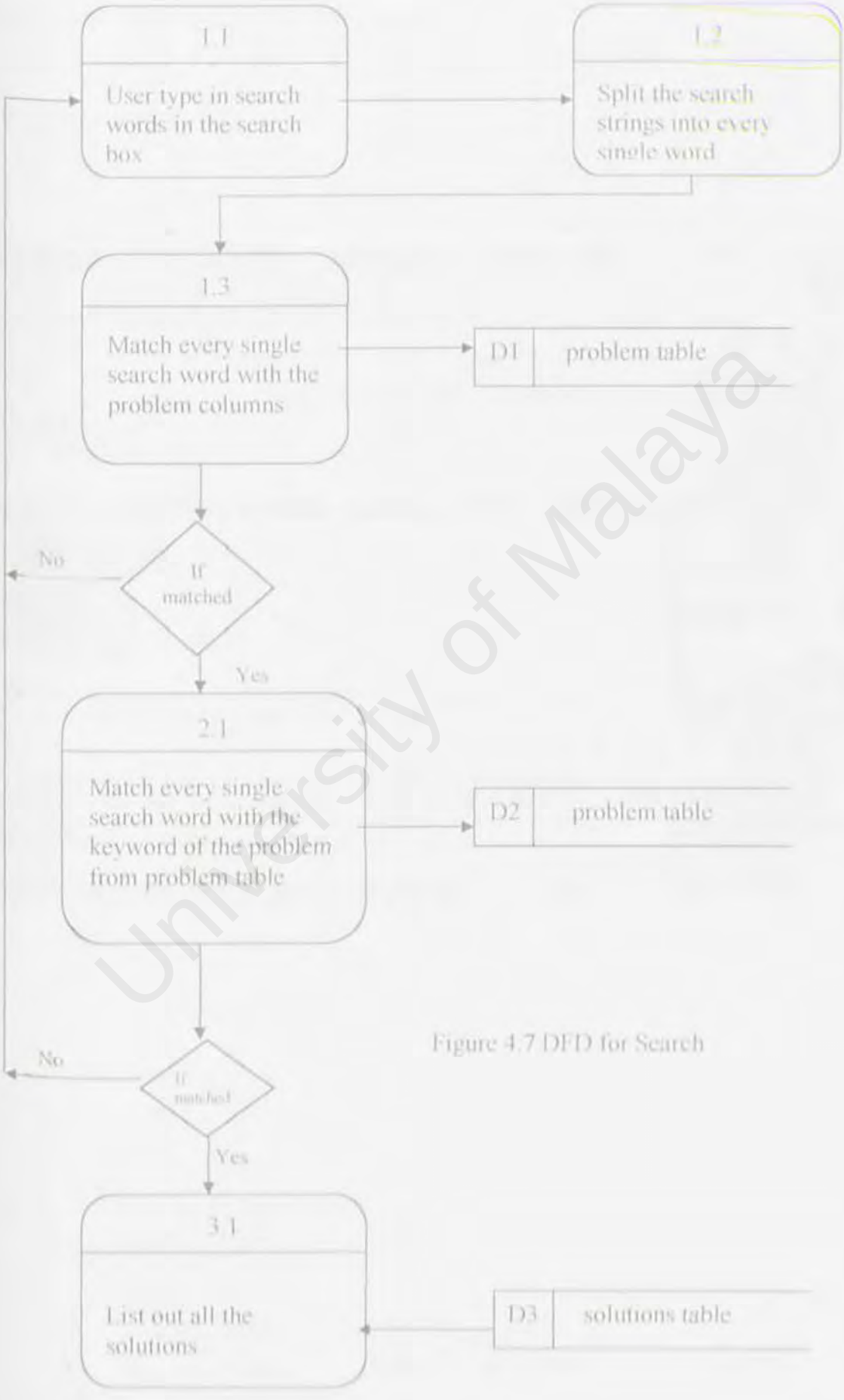

Figure 4.7 DFD for Search

4.5 User Interface Design

Below are some interface designs of the system:

This is the main page of WBCS.

Figure 4.8 Main Interface

This is the chat room interface. From here, user can see who are the users or counselors in the chat room as well.

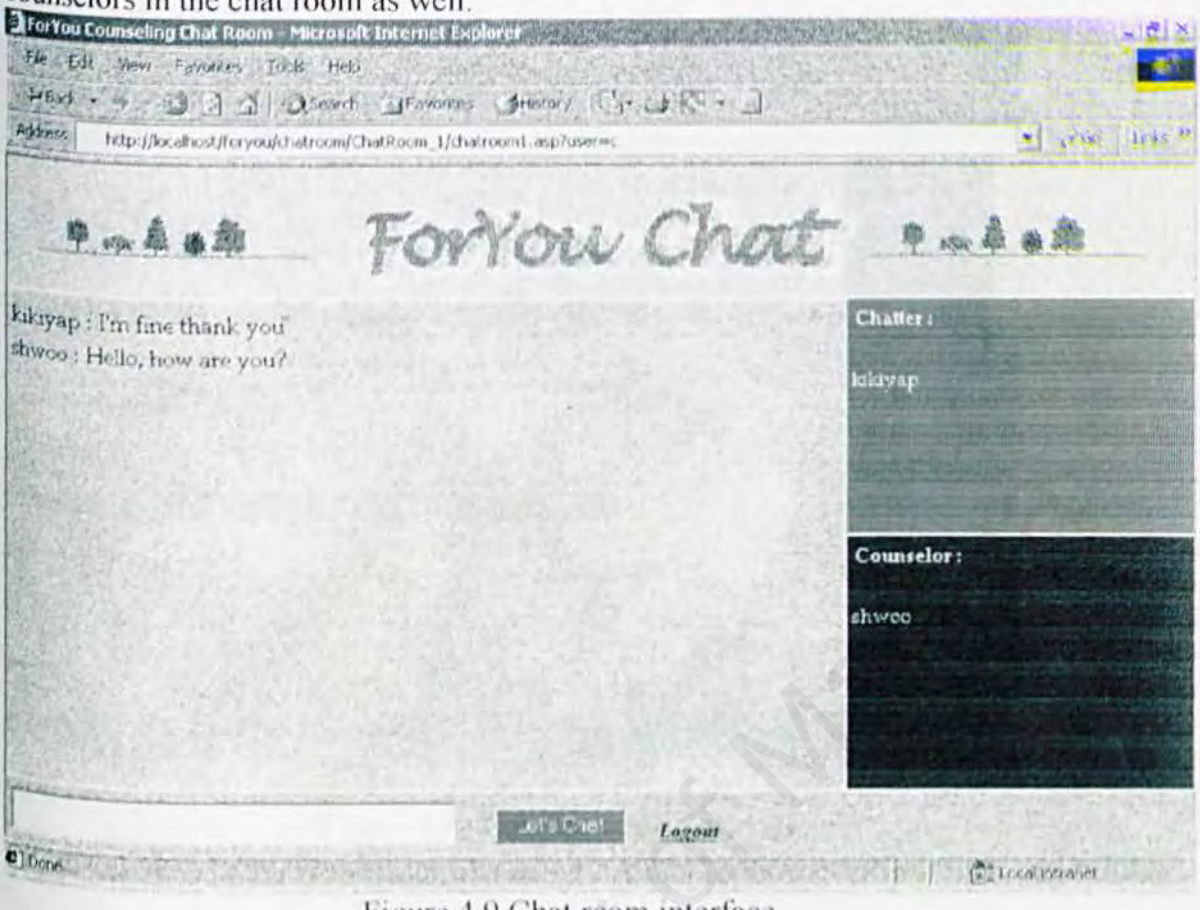

Figure 4.9 Chat room interface

This is the feedback form interface. The user may type in suggestions in the text box and click "send" button.

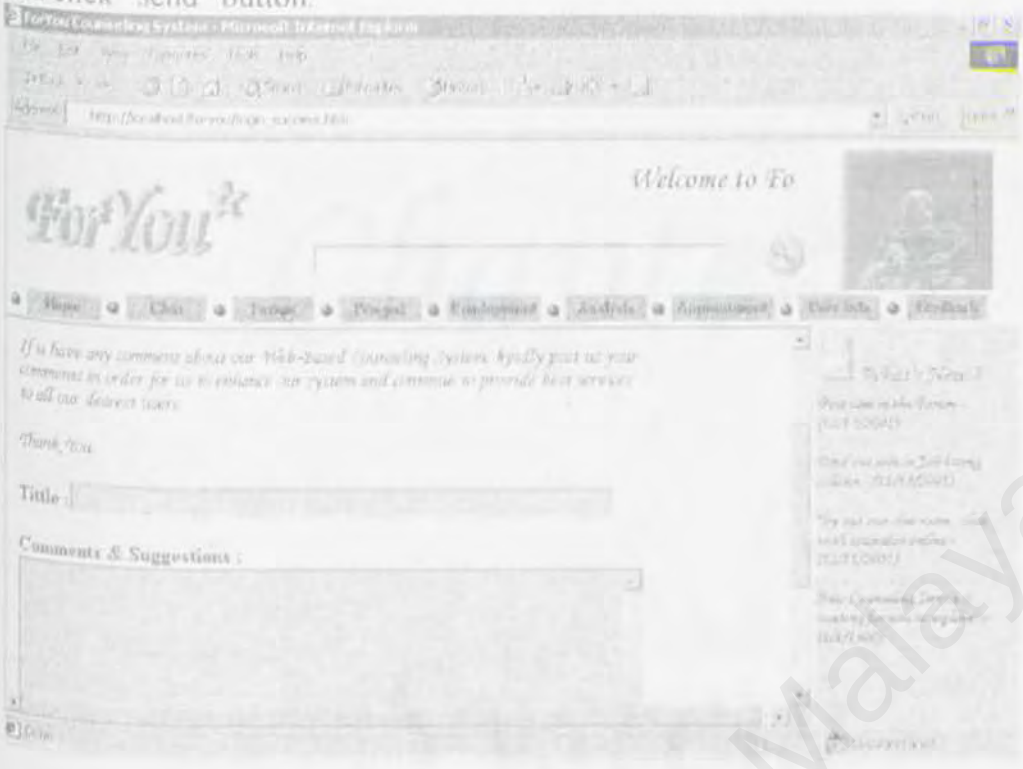

Figure 4.10 Feedback Form interface

Chapter 5

System Implementation and Testing

CHAPTER 5: SYSTEM IMPLEMENTATION AND TESTING

5.1 Introduction

The implementation phase of the system development is concerned with translating the design specification into a programming language. The primary goal of this phase is to produce a simple, clearly specified source code with complete documentation that will ease on the process of verification, debugging, testing, modification and future enhancement.

5.2 Implementation

The implementation process comprises the transition from the system design structure to executable code program. There are a few types of implementation that are used in developing the Web-based Counseling System.

5.2.1 Initial Implementation

The initial implementation process is the construction of the initial prototype that performs for the first time. The graphical user interface is being developed to interact with the users. The main page also contains buttons and hyperlinks. Then, all these components are integrated with and tested with the web browser and web server.

5.2.2 Iterative and Increment Implementation

The iterative and increment implementation occurs after a test on the current system. If there are errors occur, then further modification and correction will take place to enhance the current version of the system. This process will continue iteratively and every iteration will result a newly increments to the system.

5.3 Development Environment

5.3.1 Hardware Requirements

The hardware that are used to develop this system are listed below:

- 450 MHz AMD K6-2 Processor
- Asus Motherboard
- 256 MB RAM
- Canon 210 BJC Printer
- Voodoo Banshee 3D Accelerator Card
- 15" Color SVGA Monitor
- Standard Keyboard
- Mouse
- 1.44 MB Floppy Drive
- 50x CDRom

5.3.2 Software Configuration

The software tools used for system development are vital to the successful of implementation of this web-based counseling system. The table below lists out the software used for the development of this system.

Software	Description
Microsoft Windows 2000	The operating system and the platform to act as the server for web-based counseling system.
Internet Information Server 5.0	Web server
Microsoft FrontPage 2000	Development environment to create, edit and view the Active Server Pages.
SQL Server 2000	Database server
Microsoft Word 2000	To do documentation of this web-based counseling system
Internet Explorer 5.0	Web browser to view the web page

5.3.3 Web Server

Microsoft Internet Information Server 5.0 is used as the web server for Web-based Counseling System. IIS 5.0 is tightly integrated with Windows 2000 operating system. So, IIS 5.0 is chosen as the web server for this WBCS.

IIS 5.0 supports an application environment called Active Server Pages (ASP). Under this environment, HTML codes, JavaScript, VBscript and even ActiveX components can be combined to produce powerful web applications.

5.3.4 Database Development

The database for this Web-based Counseling System is created using SQL Server 2000. By using SQL Server 2000, the data inside the system is highly secured and can be accessed remotely through the network.

5.3.5 Web Page Development

Languages that are used to develop the Web-based Counseling System are HTML, JavaScript, Java and Active Server Pages (ASP) server and client scripts. HTML is the basic language for homepage design, whereas ASP, JavaScript are used to perform input validation and client-server interactions. Java is used to perform applet to draw graph.

The coding style is important to future enhancement and creates understanding to the system. So, the coding style should be:

- Simplicity – modular designs are used
- Maintainability – codes are organized well and commented
- Reusability – task-oriented codes are easily developed for reuse, specially for tasks that cross application boundaries.
- Testability – modules can be tested easily

5.4 System Testing

System testing ensures that the system is doing and producing the perceived output. Testing is a key part of the software development process, and is iterative. Normally the system testing includes the following process:

- running the program with a controlled set of inputs
- observing the run-time effect the inputs have on the program
- examining the program outputs to determine their acceptability

During the Testing phase, the application is verified against the requirements. This typically involves some level of system integration, function, scalability, and performance testing. Ideally, the testing phase overlaps part of development—meaning that as soon as portions of the application become functional, they can also be tested in a more formalized way than the unit testing done by developers. The documents produced during this phase are:

- Types of tests
- Test documents
- Test error ("bug") reports

5.4.1 The Testing Process

Testing is an iterative process. It should be done throughout the system development. Different testing techniques are used to accomplish the system testing goal. The testing processes used for testing this Web-based Counseling System are:

- Unit testing
- Module testing
- Integration testing
- System testing
- Acceptance testing

5.4.1.1 Unit testing

Unit testing focuses on small unit of the system's components. Each system component is tested independently without the interaction of other components. Individual components are tested to ensure they are operating correctly.

5.4.1.2 Module Testing

A module is a collection of dependent components such as an object class, an abstract data type or some looser collection of procedures and functions. There are a few modules in the Web-based Counseling System such as chatroom, forum, analysis and so on. So every module is tested separately to ensure that each module operate correctly.

5.4.1.3 Integration Testing

Integration testing ensures that the interfaces and the linked pages are called and directed accordingly. The incremental integration and the bottom-up integration approach are used. In the incremental integration testing approach, the Web-based counseling system is tested in small pages, where errors can be discovered. Bottom-up approach begins construction and testing with modules at the lowest levels in the system and then moving upward to the modules at the higher level.

5.4.1.4 System Testing

The sub-systems are integrated to make up the entire system. The testing process is concerned with finding errors which result from unanticipated interactions between sub-systems. It is also concerned with validating the WBCS meets all the functional and non-functional requirements.

5.4.1.5 Acceptance Testing

This is the final stage in the testing process before the system is accepted for operational use. The system is tested with data. One person will act as client to test the system whether it meets all the functional and non-functional requirements. Acceptance test may reveal errors in the system's requirements definition because the real data exercises the system in different ways from the test data. Acceptance test may also reveal requirements problems where the

system's facilities do not really meet the user's needs or the system performance is unacceptable in real situation.

5.4.2 Black box testing versus White box testing

Black-box and white-box are test design methods. Black-box test design treats the system as a "black-box", so it doesn't explicitly use knowledge of the internal structure. Black-box test design is usually described as focusing on testing functional requirements. Synonyms for black-box include: behavioral, functional, opaque-box, and closed-box.

White-box test design allows one to peek inside the "box", and it focuses specifically on using internal knowledge of the software to guide the selection of test data. Synonyms for white-box include: structural, glass-box and clear-box.

With black box testing, the tester has no visibility into those inner workings. The tester sees only the interfaces exposed by the system. By contrast, white box testing offers the tester full visibility into how the system works. Think of a soda vending machine. A black box test would involve inserting the money into the machine and verifying that a soda drops out and that correct change is given. A white box test might involve opening the back panel on the machine and manually triggering the switch that drops the soda.

While black-box and white-box are terms that are still in popular use, many people prefer the terms "behavioral" and "structural". Behavioral test design is slightly different from black-box test design because the use of internal knowledge isn't strictly forbidden, but it's still discouraged. In practice, it hasn't proven useful to use a single test design method. One has to use a mixture of different methods so that they aren't hindered by the limitations of a particular one. Sometime we also call this "gray-box" or "translucent-box" test designs.

5.4.2.1 White Box testing

White-box testing is control structures of a procedural design. It can derive test cases to ensure all independent paths are exercised at least once, all logical decisions are exercised for both true and false paths, all loops are executed at their

boundaries and within operational bounds and all internal data structures are exercised to ensure validity. It also may find assumptions about execution paths incorrect, and so make design errors. White box testing can find these errors. Typographical errors are random. Just as likely to be on an obscure logical path as on a mainstream path. White box testing is sometimes referred to as structural testing. Because white box tests involve the individual components of a system, they require an implicit knowledge of the system's inner workings. In implementation, white box tests introduce a given set of inputs to a component or individual function of a system and compare the outputs to an expected result. Testing is generally not done through a user interface, but by using the debugging features of the given development environment.

5.4.2.2 Black Box testing

Black box testing focus on functional requirements. It is compliment with white box testing. Attempts to find the incorrect or missing functions, interface errors, errors in data structures or external database access performance errors and initiation and termination errors.

Black box testing is sometimes referred to as functional or behavioral testing, and it offers numerous benefits. In the first place, a black box test validates whether or not a given system conforms to its software specification. In implementation, black box tests introduce a series of inputs to a system and compare the outputs to a pre-defined test specification. They test not only individual system components, but also the integration between them. The tests are architecture independent -- they do not concern themselves with how a given output is produced, only with whether that output is the desired and expected output. Finally, as they require no knowledge of the underlying system, one need not be a software engineer to design black box tests.

5.4.2.3 Conclusion

With white box and black box testing, the structure design and the functional requirements of Web-based Counseling System can be tested thoroughly to ensure that it is less error occurs.

5.5 Types of errors

There are a few kinds of errors that encountered during the testing phase of the development of Web-based Counseling System.

- Compile errors

  Compile error result from incorrectly constructed code by incorrectly typed keyword or omission of some necessary punctuation. Compile errors include errors in syntax.

- Run-time errors

  Run-time errors occur when a statement attempts an operation that is impossible to carry out. For example, division by zero.

- Logic errors

  Logic errors occur when an application does not perform the way it was intended to perform.

Chapter 6

System Evaluation And Conclusion

CHAPTER 6: SYSTEM EVALUATION AND CONCLUSION

Throughout the system development, there are a lot of problems encountered but most of them are eventually resolved. Encountering with these problems has been proven to be a valuable learning experience. The system was evaluated to identify its strengths, limitations and proposals were made for future enhancement.

6.1 Problems Encountered

6.1.1 Difficulty in defining the system scope

At the beginning phase, it was doubtful that what features and functions that should included because of limited information gathered and experience. As this involves developing a web-based counseling system, to build a fully-fledged system is quite difficult with lack of experience and information in the counseling field. This is due to the fact that most of the developers and users are reluctant to disclose any internal information on the web-based counseling system as it is developed for commercial purposes. Discussions were held with the project supervisor and other project members to outline the scope of the project. Further reading on counseling handbooks and research on the counseling web site online helped to define the features and functions of the web-based counseling system.

6.1.2 Difficulty in choosing a programming language

There are many programming languages available in the market, which can be used to develop a web application. To decide which languages to use, seeking advices from project supervisor and course mates are carried out. After much seeking, references and studies, ASP (Active Server pages) and JavaScript are chosen prior to develop this web-based counseling system.

6.1.3 *Difficulty in understanding client-server system, TCP/IP and application protocol*

At the initial stage of the project, researches and studies were carried out to understand how the web-based applications communicate and also the interactions between the client-server system. The TCP/IP model was studied as well to understand how the HTTP, FTP, SMTP and POP3 work.

6.1.4 *Lack of experience in web-based programming*

As there is lack of experience and knowledge in web-based programming, a lot of studies need to be done. ASP, JavaScript, SQL and HTML need to be learnt within a short span of time. Web-based programming is a bit different from C or visual basic. The combination of different language also quite complicated and confused. For example the global asa is difficult to understand because it is written in VBScript and ASP.

6.2 System Strengths

6.2.1 *Simple and User Friendliness*

This web-based counseling system is designed to be simple, well organized and easy to use. The interfaces of the web-based counseling system are developed based on Graphical User Interface concepts. A lot of interesting and colourful buttons are used in the design of the web page. The hyperlinks designed are also understandable and nice. User should be able to navigate through the web page by just pointing and clicking to the relevant pages.

6.2.2 *Reliable system with effective error handling*

The web-based counseling system is a reliable system where it can cater almost all the possible errors encountered. All the inputs from the users are validated and verified. For example, the user needs to provide correct username and password before the user can access to the page. A registration failure will be handled by the system by displaying error messages informing the user about the error. If the user successfully logs in to the page and favorite the page, it still needs to log in when the user tries to click anything else when the user opens the favorite page.

6.2.3 *System transparency*

System transparency refers to the condition where the users do not need to know where the database resides, how is the system structure, system database management and anything related to the internal structure of the system.

6.2.4 *Easy to access*

The web-based counseling system is easy to access as long as there is a web browser on the computer and network connection. Users can access to the page from any corner of the world and anytime they like.

6.2.5 *Agent*

There is an agent on the page to communicate with the user. The agent in the backend application will tell the user what the user can do on that application.

6.3 System Limitations

Due to the experience and skill poorness, this web-based counseling does not support all the functions that are provided by a commercial online counseling system.

6.3.1 *Web browser limitation*

This web-based counseling system requires a JavaScript support browser in order to access to this page. User using the browser that does not support these features will not able to use all the available functions in the system.

6.3.2 *Response time*

The web-based counseling system needs a reasonable time to load because the pages contain a number of graphics. Although the response time is not that fast, but it seems reasonable while the graphically page design cannot be avoided.

6.3.3 *Performance dependants on network*

The overall performance of this system depends heavily on the user's network connection or transmission line. Heavy traffic jam on network will eventually prolong the loading time of the web page. The speed of user's modem is also an important factor to the performance of the system. Low speed modem will eventually discourage the user in using the system in the future.

6.4 Future Enhancement

System development has no boundaries as new requirements and better implementation methods continue to arise and evolve. Enhancement should be made to improve the system limitations. There are several suggestions that can extend the usability of the current system.

6.4.1 *Interactive help module*

Currently, this system does not provide any help function except the agent only appeared on the backend application. In future, a help module should be integrated into the system. This help module should be context-sensitive so that the user can navigates the page easily and gets what they want.

6.4.2 *Support email services*

To benefit all the users, counselors and administrator, an email services can be integrated into the system to response with each other. Email can be automatically generated and sent after a new user successfully registered to Web-based Counseling System. If there are any big and special events are going to launch in web-based counseling system, then email will be sent automatically to all the users to notify them about the event.

6.4.3 *Integrated online payment services*

The current system cannot support the online payment services. In future, online payment services can be integrated into the system where organizations will be charged on advertising and posting jobs on the web-based counseling system.

6.4.4 *System security*

Due to this system is a counseling system, so all the user's information should be kept in highly confidential style. As a result, system security is an important aspect to protect this important information.

- Firewall can be set to protect any unauthorized user to access to the web-based counseling system.
- Digital signature provides a way to associate the message with the sender and is the cyberspace form of "signing".
- Encryption can be used to protect other user to view the important data when the data is transforming through the network. For encryption, there are two unique keys, public key and secret key. Public key is available to all other

users and the secret key is kept by the user itself. The two keys work together as an intriguing kind of matched set.

6.5 Conclusion

Overall, this Web-based Counseling System has achieved and fulfilled the objectives and requirements as a web site that providing counseling services. This system is really easy to use and learn. Web-based counseling system will be beneficial for those who is familiar with Internet and needs the counseling services. Information and guidelines are available to the users and the users can get it by just a few clicks. The web-based counseling system is useful to the system management too because it provides a backend application to maintain and enhance the system remotely.

There was a lot of knowledge gained throughout the development of this system. This includes knowledge in web application development, Internet technologies, Internet environment, programming, software engineering concepts, database and even web server control. Programming using ASP, JavaScript and HTML proves to be a valuable experience and is a good way to test our creativity to solve problems. Interface design using FrontPage is a good start into the web page design. Defining the functional and non-functional requirements of the system is also a good experience for the process of system development. Yet programming techniques are important in developing the system, good software engineering practices must also be applied. Theories and knowledge gained from the previous courses such as System Analysis, Project Management, Database, Software Requirements Engineering and others can be applied into this project.

The eventual of the project is a working prototype, which is simple yet workable. There is much more room for improvement in this web-based counseling system, in terms of implementing a more comprehensive system. With further enhancements, this system will be more reliable and able to incorporate more features and even to be an artificial intelligence system.

Appendix

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Protocol	Procedures for the interchange of electronic messages between communicating devices.
RAM	Random Access Memory
SMTP	Simple Mail Transfer Protocol
Server	A computer that provides services through a network to other computers.
SAPs	Server Access Points
Socket	Combination of an IP address and a port number.
TCP	Transmission Control Protocol
TELNET	Terminal Emulating Program
UDP	User Datagram Protocols
URL	Uniform Resource Locator
UTP	Unshielded Twisted Pair

Terminology and Acronyms

ASP	Active Server pages
API	Applications Programming Interface
DBMS	Database Management System
DLL	Dynamic Link Libraries
DNS	Domain Name Server
FTP	File Transfer Protocol
GB	Giga Byte
HTML	Hyper Text Markup Language
Http	Hyper Text Transfer Protocol
IP	Internet Protocol
IEEE	Institute of Electrical and Electronics Engineers
ISO	International Standards Organization
ISDN	Integrated Services digital Network
MB	Mega Byte
MPEG	Motion Picture Experts Group
OSI	Open System Interconnection
OOP	Object Oriented Programming
Packet	Transmission of Data in Short Blocks

Interview Section with Cik Zaiton Mamat (Pegawai Rundingcara) from Counseling and Career Section of University Malaya

Question 1: What are the important techniques used in counseling?

Answer : Actually, technique of communication is very important to understand the client. The way of directing, reflecting and explaining will help the counselor to understand the client.

Question 2: What is the important aspect of counseling?

Answer : Privacy is a very important aspect that every counselor should remember. The information of the client should be kept confidentially. The information includes client's profile and problems.

Question 3: What is important in asking client question?

Answer : Always ask question with "What" and "How".

Question 4: Normally what are problems that the students in University Malaya faced?

Answer : Normally they will face with some personal cases like pressure in academic, love, relationship with friends and parents and negative thinking about life.

Question 5: If the client takes some negative actions after getting some misunderstanding information from the counselor, do the counselor need to responsible for that?

Answer : Every time before the counseling session, the counselor should explain to the client that this is just a discussion. If there are any further actions after the discussion, it will be the client's responsibility.

Question 6: What is the duration of a counseling session?

Answer : Normally, the counseling session will takes about 45 minutes to one hour.

User Manual

Contents of Web-based Counseling System User's Guide

List of Figures

Chapter 1 INTRODUCTION

1.1 Introduction

Welcome to the Web-based Counseling System! The Web-based Counseling System is a web-based counseling system that helps users to search for their problems and solution and access some other services that is available during normal counseling section. Web-based counseling system is an electronic way of counseling services. Apart from being useful to the clients, this system also provides an efficient backend management application for the management of the system. This system is easy to use, where all the functions in this system is meaningfully descriptive and can be easily executed by a simple point and click on the available function button and hypertext link.

This system consists of 10 modules.

1. **Login Module**
   - This module provides function to validate the users before they can access our service. Users need to register as a new user of Web-based counseling system and login to the system every time they access to the web site. This is for security purpose of the web system.

2. **Search Module**
   - This module provides function for users to key in the search word which is the problems they faced. The system will perform intelligent checking through databases and shows the available solutions to the users.

3. **Chat Room Module**
   - This module provides real-time chat function for users to chat with counselor (single chat) or to chat with other users that faced the same problems (group chat).

4. **Forum Module**
   - This module provides function for users to post their question or discussion topic to the system. Then users from all around the world may participate in this discussion and provide valuable ideas and suggestions.

5. **Pen-pal Module**
   - This module provides pen-pal service for users who want to meet with more friends. They may view the pen-pal list, add themselves in the pen-pal column or delete them if they don't want to be appeared in the pen-pal list.

6. **Analysis Module**
   - This module provides analysis function to analyze the most critical problems faced by all the users. This module will capture what the users search most often and calculate the percentage of the problems encounter. Then a comparison graph will display the result of the analysis.

7. **User Info Preview Module**
   - This module lets the users to view their personal information they provide to the system when they registered. They can modify the information and update the information.

8. **Message Board Module**
   - This module provides function for the users to be informed for the latest information announced by counselors or administrators.

9. **Feedback Module**
   - This module provides function for the users to send their comments to the web administrator.

10. **Backend Administration Module**

- This module provides function for the counselors and administrators of Web-based counseling system to maintain and enhance the usability of the web page.
- This module consist of 6 sub modules which is :

For administrator:

1. **Login sub module**
   - This sub module will validate the administrator before allow them to connect to our database.

2. **Database update sub module**
   - This sub module allows the administrator to modify the contents of the counseling data in the database. This include add new, delete and modify the existing data.

3. **User info sub module**
   - This sub module helps the administrator to maintain the user profile for counselors and administrator. This include add new counselors/administrators, delete or modify the existing profile.

4. **Message board sub module**
   - This sub module helps the administrator to announce the latest information to the users. Administrator also can preview the previous messages.

5. **Feedback preview sub-module**
   - this sub module allow the administrator to preview the comments provided by users in order to be more understanding users need and proceed with enhancement.

For counselor:

1. **Login sub module**

   - This sub module will validate the counselor before allow them to connect to our database.

2. **Change password sub module**

   - This sub module allows the counselor to change their password if they feel that there is a need to do so.

3. **User info sub module**

   - This sub module help the counselor to view the users registered to him/her. This includes viewing the users' info and all the search word they provided during their search.

1.2 Hardware Requirement

The minimum requirements to run Web-based Counseling System are:

- A IBM compatible PC with 166 MHz processor and above
- 16 MB RAM (32MB recommended)
- SVGA Graphic Adapter (able to support 800x600 resolution)
- Keyboard
- Mouse
- Network card

1.3 Software Requirement

The software requirements to run Web-based Counseling System are:

- Any JavaScript-enabled browser (Microsoft Internet Explorer 3.01 and above recommended)
- Microsoft Windows 95, 98, NT, Me and 2000

CHAPTER 2

Web-Based Counseling System (WBCS) Main Menu

2.1 *Starting WBCS*

To start Web-Based Counseling System, user needs to start their web browser. It is recommended that the display setting for the client computer is set to 600x800 resolution to maximize WBCS functionality. Then user type http://commerce/ForYou/ForYou.htm and press Enter Key.

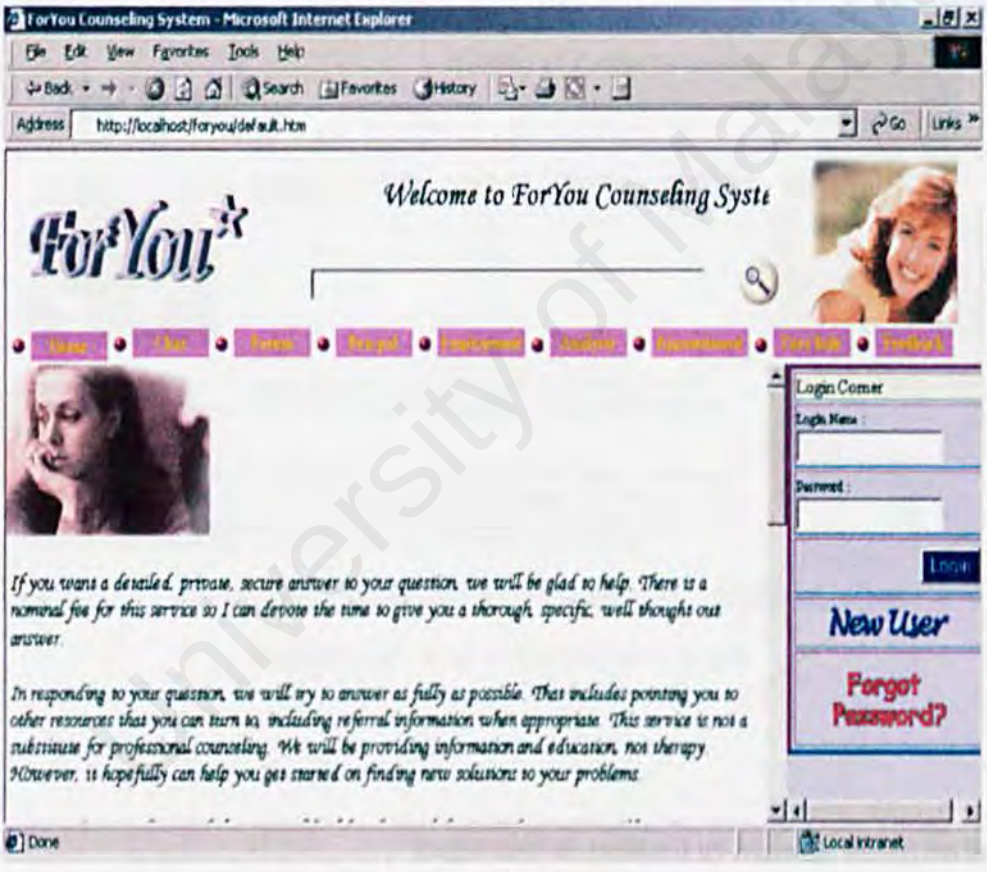

Figure 2.1: WBCS main page

Login

To login, the user has to key in a valid login identity (ID) and a valid password. After typing your access ID and password, you may click the login button to allow the system to process the verification. After login, the following will be displayed with the login section replaced by message board section.

Figure 2.2 : Login Successfully page

Login Section replaced by Message Board Section

.1 Error Login

If the user key in the wrong user ID or password the following page will be own to ask for user ID and password again. Due to responsibility purposes, we ached the terms and condition together for user reference

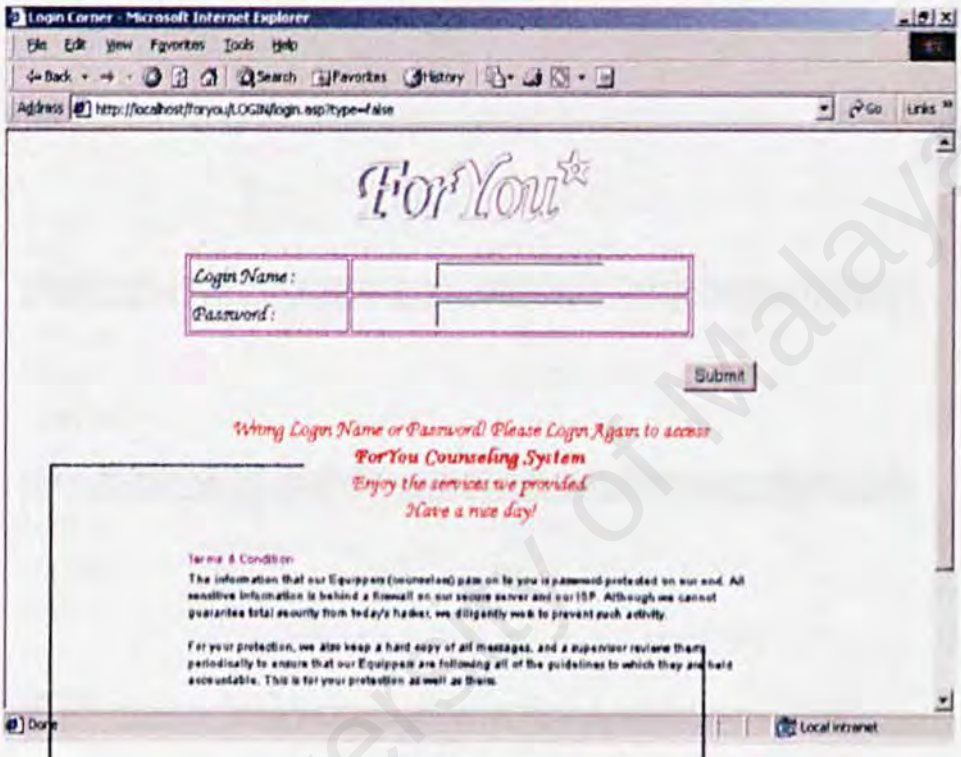

Figure 2.3: Error Login Page

Message indicates the wrong password or login ID

Terms and Condition for user agreement

.2 New User

If the user is new to WBCS then the user need to register to become WBCS member before the user can enjoy all the services provided. After the user click on the "New User" button in the login column, the following page will be displayed and the user are required to complete the registration form providing all his/her personal information to WBCS.

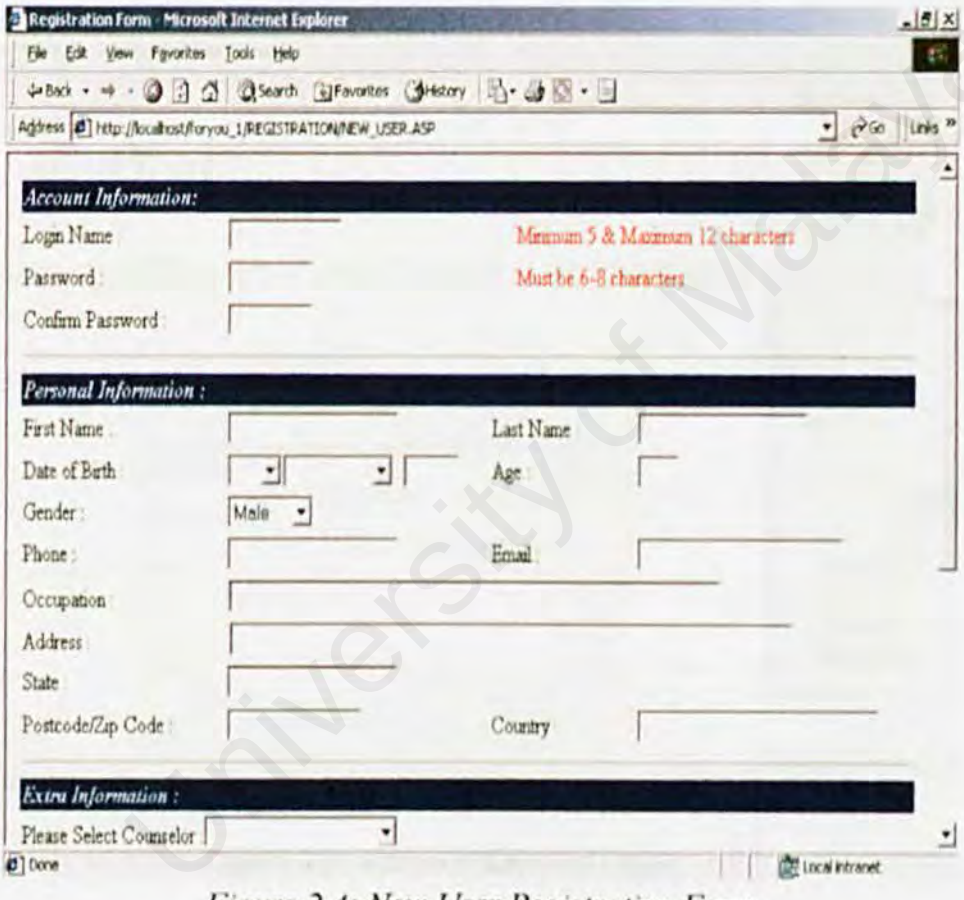

Figure 2.4: New User Registration Form

2.2.3 Forgot Password

If the user forgot his/her password, he/she may click on the "Forget Password" button. The following page will be appeared to ask for user ID and email address. If the user forgot his/her user ID also, then he/she may need to contact the WBCS administrator for further action.

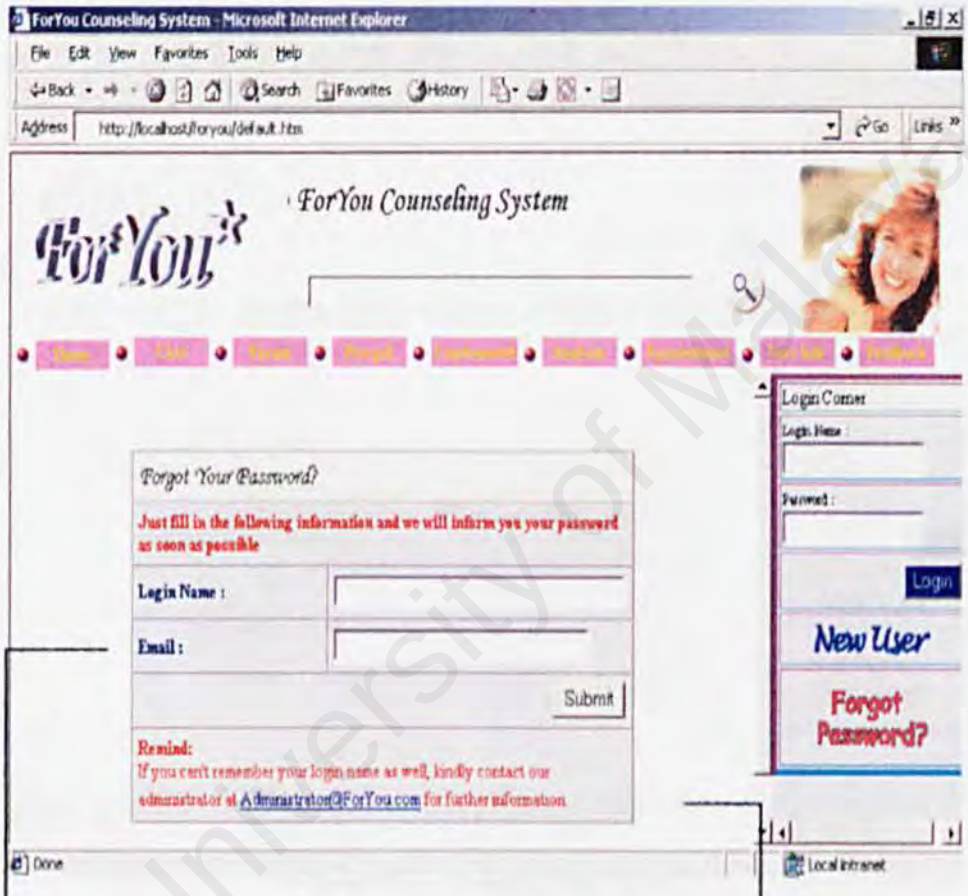

Figure 2.5: Forgot Password Page

Key in the login ID and email to get your password.

WBCS Administrator email address for those who forgot their user ID as well.

2.3.1 Secret Question and Answer

Once the system validate the User ID and email address is correct, the system will display the user secret question and answer to remind the user. If the user still can not remember the password, he/she need to contact the administrator for further actions.

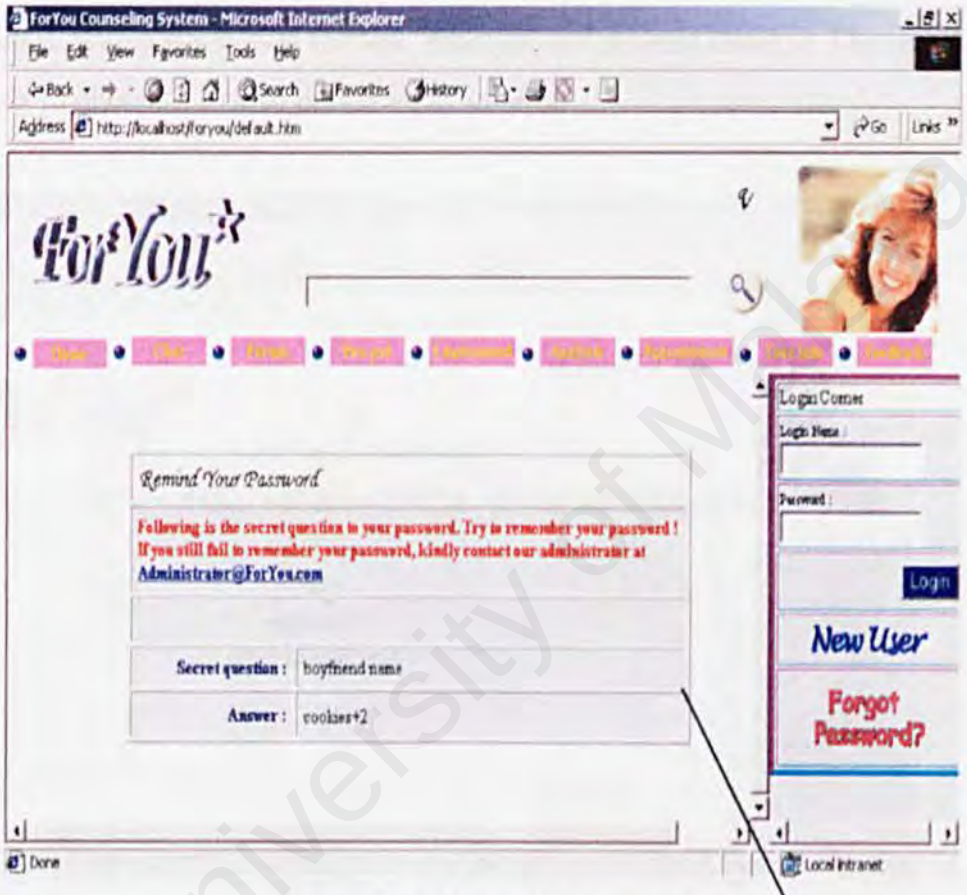

Figure2.6: Remind Password

Secret question and answer to remind user password

3 *Search*

The main purpose or the WBCS is to provide search engine for counseling perspective for the users. The user may key in a string containing their problems and the system will generate possible link to the page that containing the solution to the problems. For example, if the user key in "fear, emotion and drink alcohol problems" the system will display three types of possible solution which is solution for fear, emotion and prevent alcohol. The user needs to choose a link to preview the solution.

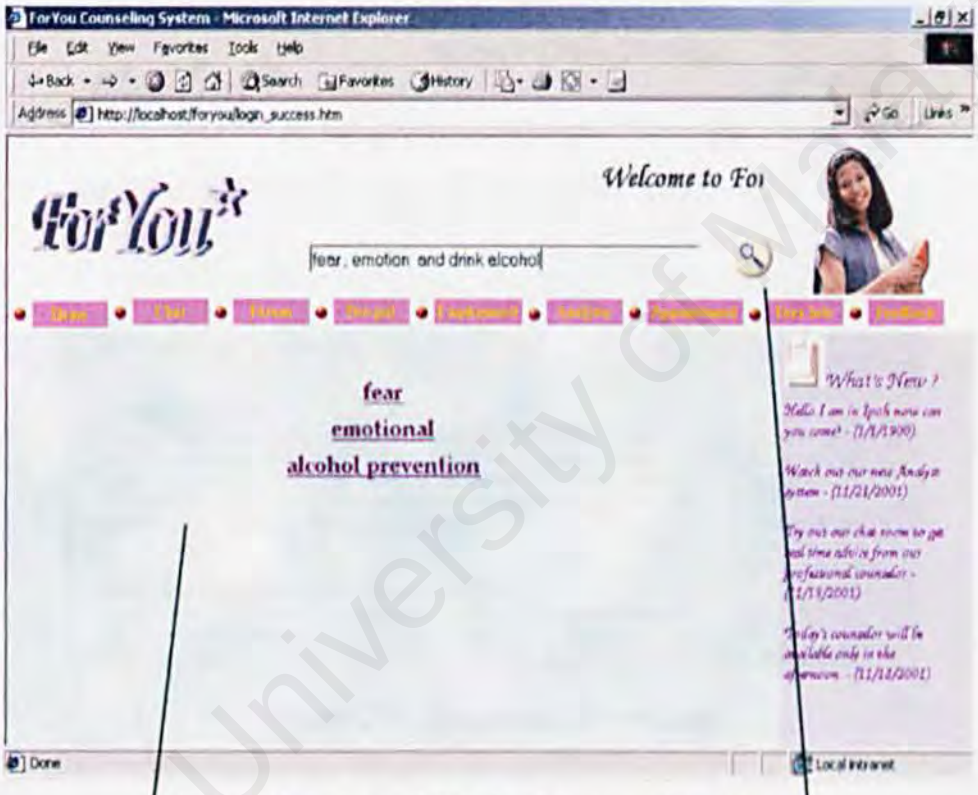

Figure 2.7: Search for Problems and Solutions

Search String

Solution Link

3.1 Solution to Search Problems

The solution for the selected solution link will be displayed to help the user to solve their problems. The solution provided is just a guideline for the user to solve their problem. If the user does not satisfy with the answer, he/she may continue to search again using different search string.

Figure 2.8: Solutions to Problems

Solutions guideline for user to preview

3.2 No Match for Search String

If the user searches for something that is not provided by WBCS, then the system will display a page to inform the user that there is no match found for his/her search. The user may type in different search string to search again.

Figure 2.9 : No Matches for Search

Chat Room

WBCS provide two kinds of chat rooms for the user:

I. Private Chat Room

Three private chat room is available for the user to chat with the counselor online in the real time environment. The room is only restricted to one user and one counselor at a time. This is built on privacy purposes. Before the user select a room to go, he/she may look at the "counselor on duty" to confirm whose counselor is available and the column "status" indicates that whether the room is available for that time.

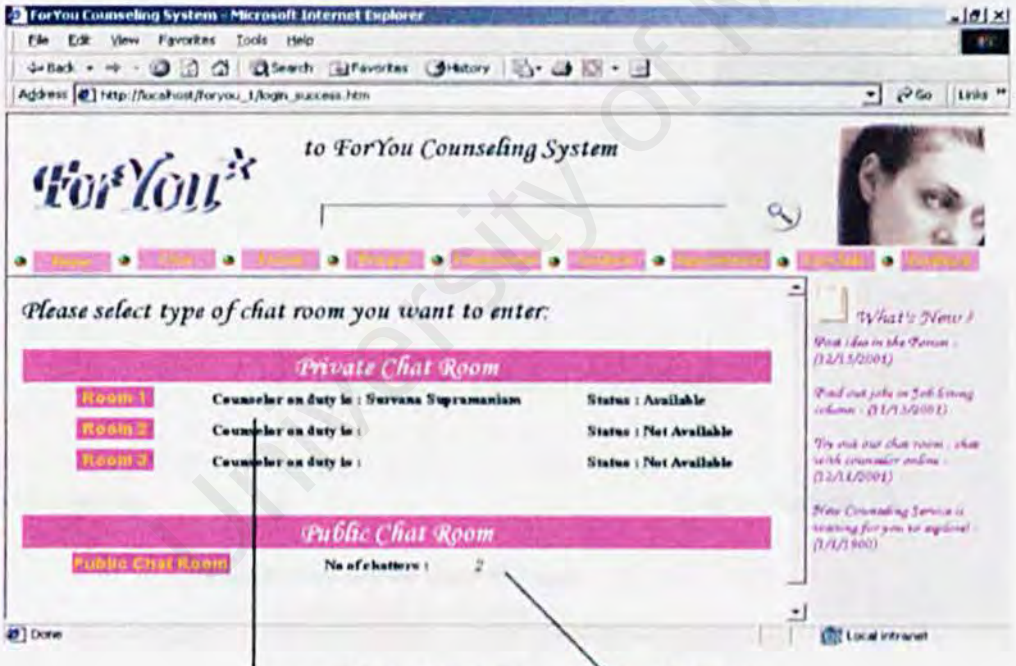

Figure 2.10 : Chat Room Type Selection

Indicates whose counselor is in the room

Indicates how many chatters are in the public room

The user ID of the user will be appeared in the "chatters" column and the counselor ID will be appeared in the "counselor" column. The contents of their chat are shown in the middle column. Twelve lines of previous chat will be shown on the screen. If the user wants to log out, he/she may click on the "logout" button or just simply close the browser. If the counselor left before the user left, then the user in the room will automatically be directed back to the main page.

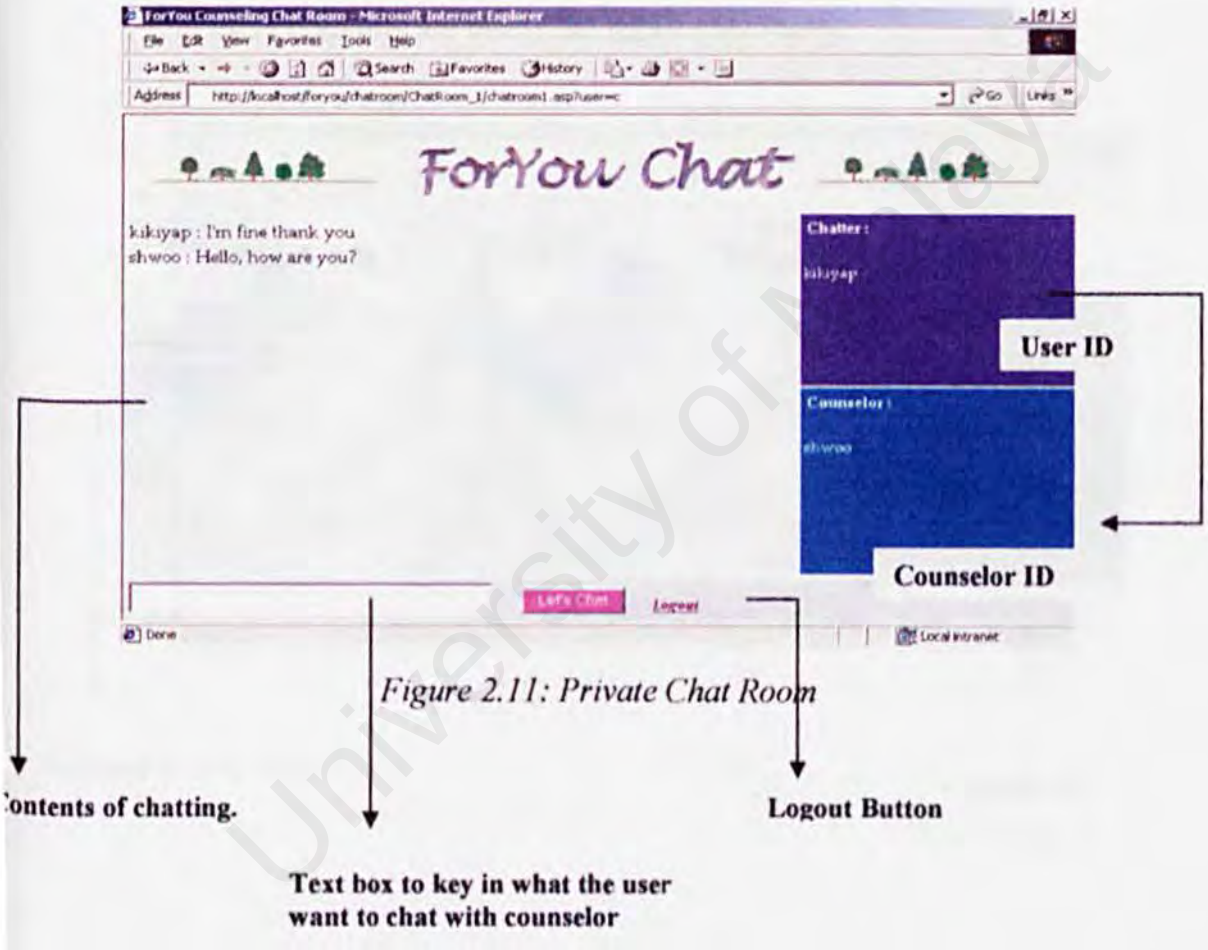

Figure 2.11: Private Chat Room

II. Public Chat Room

Public Chat Room is open for the entire user to discuss their problems and solution together. There were no limits on how many people is allow accessing the public chat room. User may chat with other users that may come across the problem before and get the solution from them.

Before user come in the public chat room they may look at the "number of chatters" column shown in Figure 2.12 to preview number of users currently are inside the public chat room.

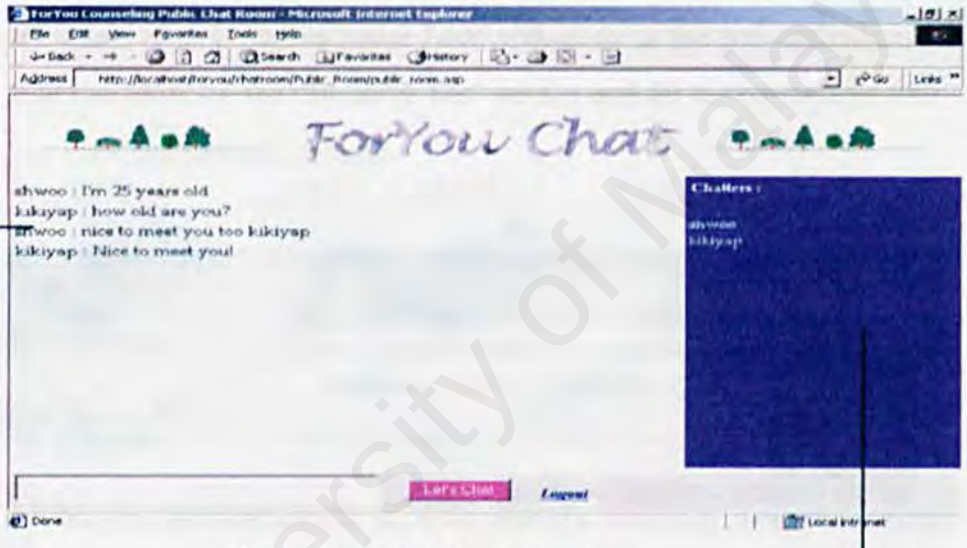

Figure 2.12: Public Chat Room

Contents of users' chat

Chatters ID

5 *Pen-pal Column*

Pen-pal column is designed to help the WBCS members to meet with each others. The users can add their name in the pen-pal column by clicking the "Register Me" button. The system will automatically search for the user profile and add to the pen-pal column. This will minimize the user work to key in their name and details again.

The user may just click on the email address and send an instant email to the selected pen-pal. This can bring closer the relationship between WBCS members.

If the user wants to stop his/her name from appearing in the pen-pal column, he/she may just click on the "Remove Me" button and all the particulars will be remove from the pen-pal column.

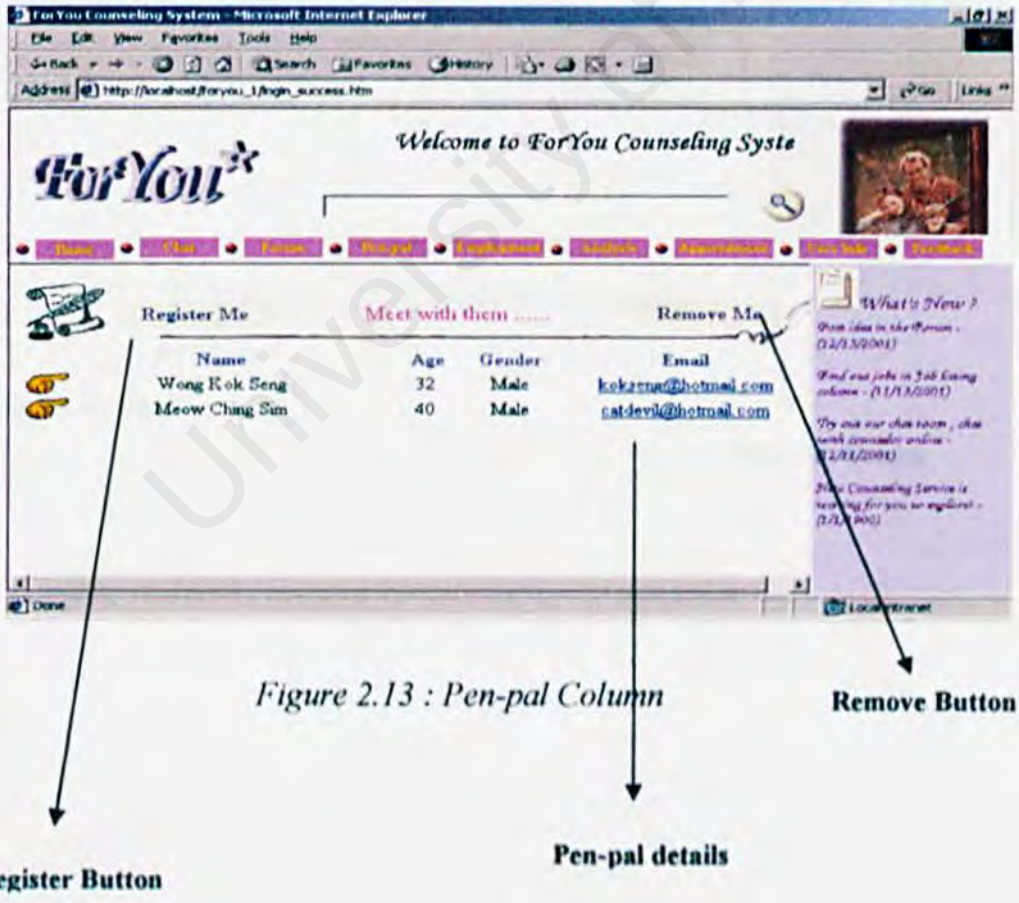

Figure 2.13 : Pen-pal Column

Employment

If users are looking for vacancies, they can click on the "Employment" button to look for jobs available. The Employment section published the company's name, total vacancies, position and company's email to help the user to find for their favorite jobs. If the user is representing a company, he/she may post a job in this Employment section to look for employee. This can be done by a click on the "Post Job" button.

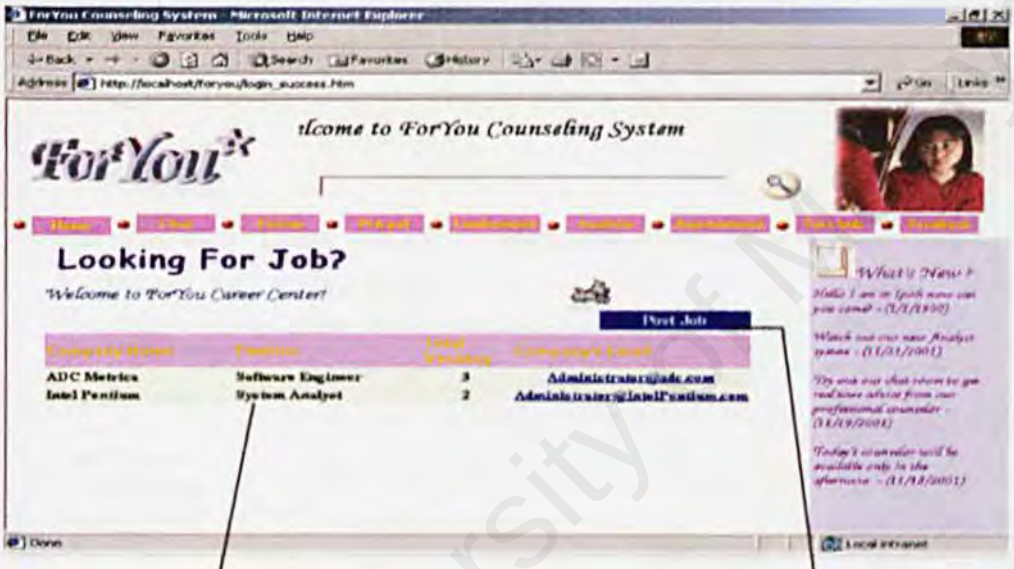

Figure 2.14: Employment Section

Vacancies available

Post Job Button

.1 Register Company to publish vacancies

This page is designed mainly to help the company to publish their company vacancies. The company needs to provide all the necessary information like company's name, position, total vacancies, company email and expiring days for the WBCS. The WBCS will store all the information and publish the job on the employment section as stated above. The duration to publish the job will follow the expiring days.

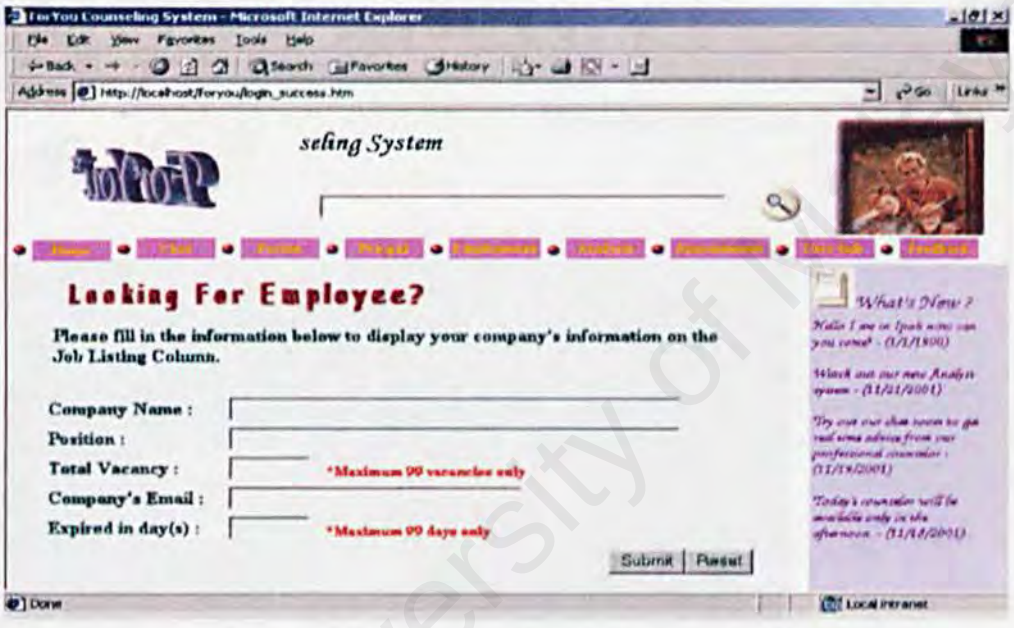

Figure 2.15: Company and vacancy details

Analysis

Every time the user use the WBCS search engine to search for the solution to their problems, the search string will be stored in user's personal table. Then, the WBCS system will compare the problems entered by every user and calculate the statistics of the problems. The analysis page will show a graph indicates the statistics of the result. All the comparison will be converted to percentage for user to preview.

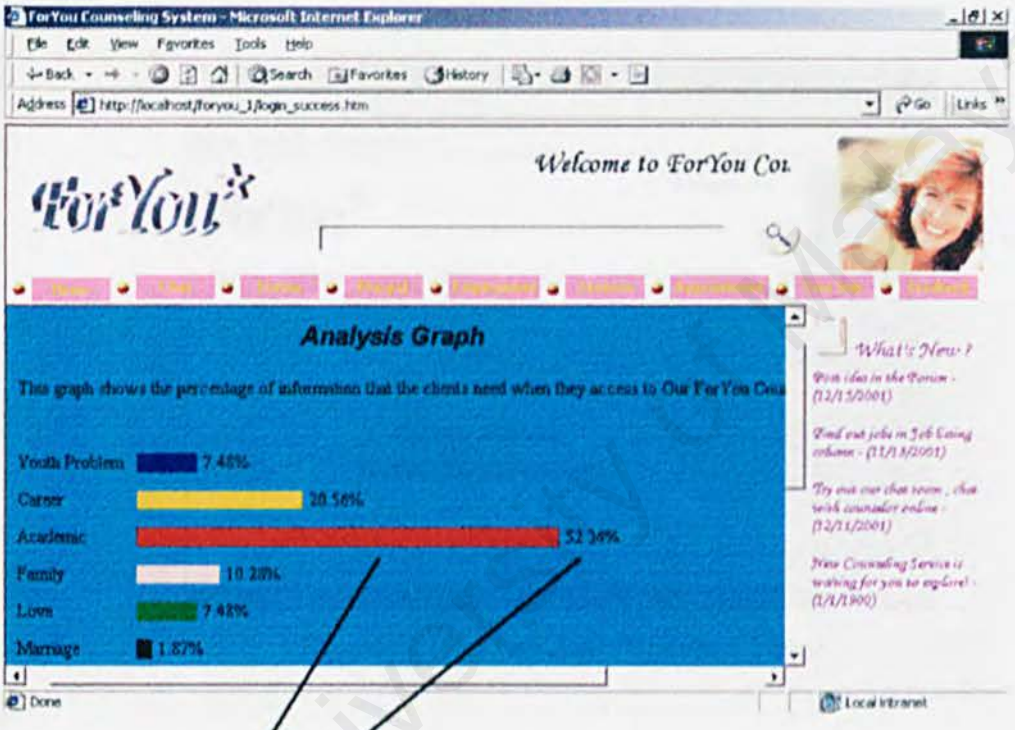

Figure 2.16: Analysis Page

Comparison in terms of percentage

User Info

Sometimes users may want to make changes to their personal details for example phone number or address. They may click on the "User Info" button to preview their previous personal information. Then they will come to a page which contains a menu for selection for "change password" or "change user info" as below.

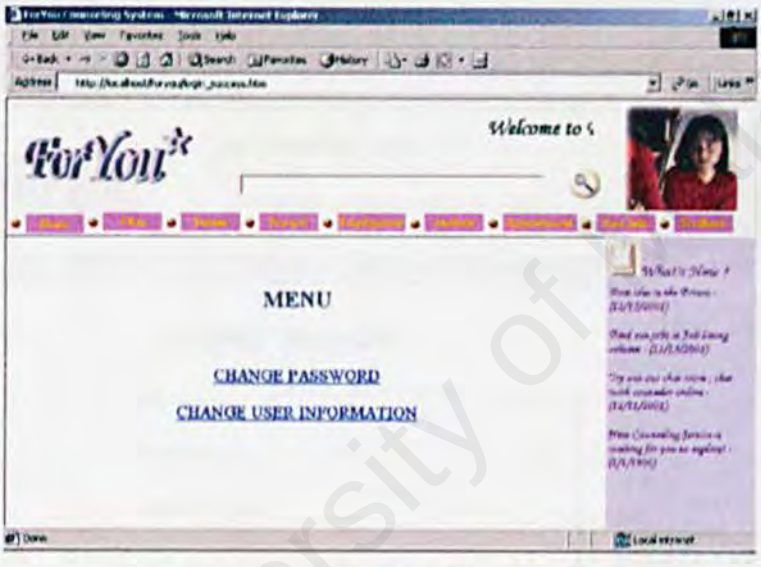

Figure 2.17: User Info Selection Menu

.8.1 Change Password

If the user wishes to change his/her password, they may feel free to do it here. The only step is they need to fill in their old password to validate their identity and then fill in the new password. The confirm password fill is required to prevent the user from keying the different password. When the use click on the "change" button, the system will indicates that the password is changed successfully or failed.

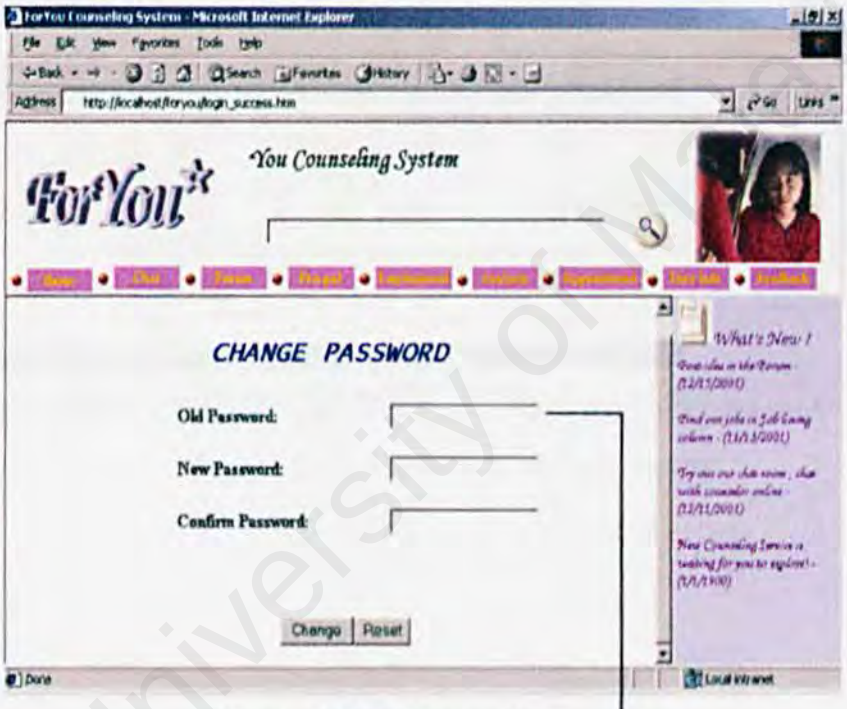

Figure 2.18: Change Password

All three text boxes must be filled in order to change password

2.8.2 Change User Information

If the user selects the "change user information" from the menu, then he/she will be directed to the page displaying all the profile that was stored in the WBCS. The user can may any changes to the profile and click the "update" button to update the user profile.

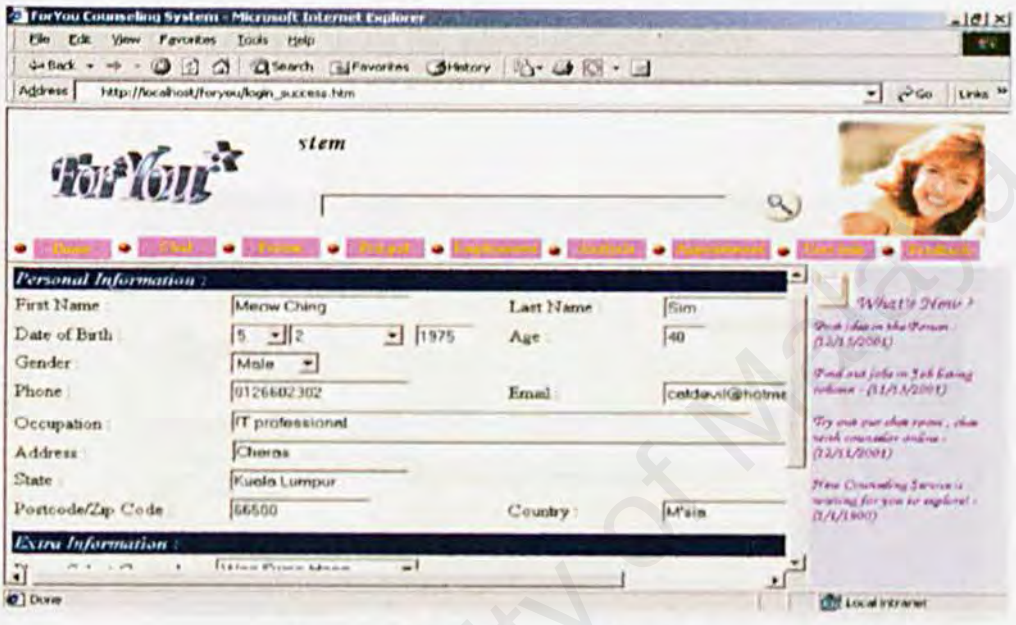

Figure 2.19 : Change User Information

2.9 *Feedback*

The users are welcome to give comments and feedback to the WBCS. The user only need to fill in the title of the feedback and fill in the comments or feedback and click the "send" button to send the feedback to the WBCS administrator. The WBCS will automatically send the feedback together with date and the user ID and send it to the Administrator. The administrator will preview the feedback using the administration system.

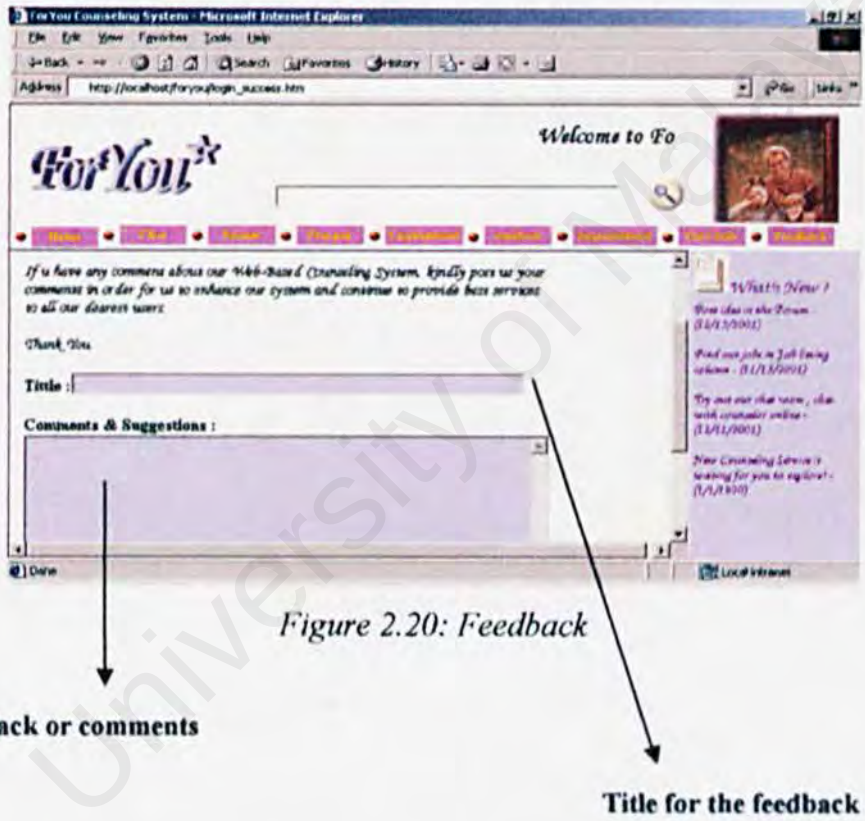

Figure 2.20: Feedback